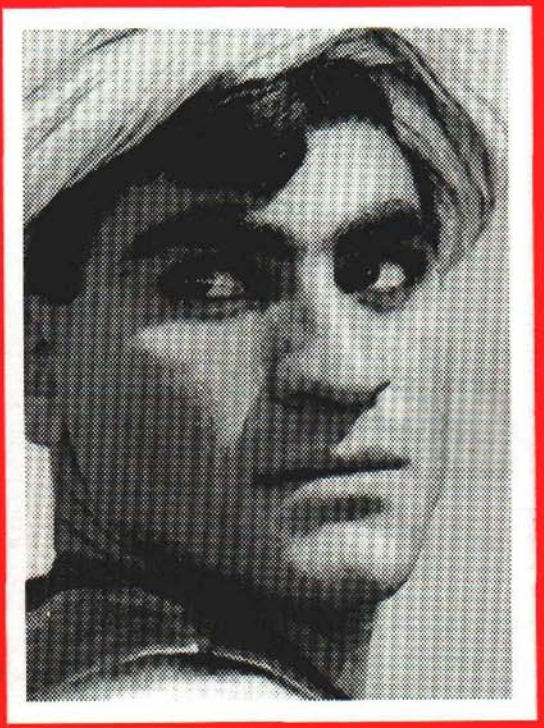
THE MANKIND QUARTERLY



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Cover Picture: A contemporary Pakistani inhabitant of the Indus Valley.
(See Article: *Languages of the Proto-Historic Indus Valley*)

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Languages of the Proto-Historic Indus Valley

Tariq Rahman
Rawalpindi

The author researches evidence that might identify the language or languages of the Indus Valley in prehistoric times up to the Islamic invasion in 1000 AD. He argues that in the absence of adequate linguistic evidence it is necessary to investigate archaeological, historical and anthropological evidence and draw deductions from these data.

The Indus Valley (Marshall 1931), or Harrapan (Piggott 1950), civilization was discovered in 1920-21 when engraved seals were discovered near present-day Sahiwal in Pakistani Punjab at a place called Harappa (Marshall 1926). Later Rakhal Das Banerjee, John Marshall, E.J.H Mackay and M.S. Vats carried out excavations at Mohenjodaro in Sind and discovered the buried remains of a civilization with a pictographic script (ibid 47-48; Mackay 1936; Marshall 1931). Many archaeologists, including the celebrated Sir Mortimer Wheeler, added to our knowledge of this civilization (Wheeler 1968). We now know that it extended to the Yamuna (Lal & Thapar 1967:79; Ghosh 1989:94-95) along the bed of the river Ghaggar in Rajhastan, Gujrat and upto the mouths of the rivers Narbada and Tapati (Sankalia 1974:384-385; Lal & Gupta 1984:1-25).

It does appear, however, that the major sites of this civilization are in Pakistan. In fact it is in Pakistan that an earlier phase of it has also been unearthed. This happened between 1955-57 when a Pakistani archaeologist, F.A. Khan, discovered a town of the pre-Indus period (c. 3300-2800 B.C) at Kot Diji in Khairpur, Sind (Khan 1965). Such sites were also discovered by Rafique Mughal in Bahawalpur, especially in the Cholistan desert, extending the area of this culture to the whole of southern Pakistan (Mughal 1981; 33-42). The area was further extended by Ahmad Hasan Dani, the Pakistani archaeologist and Sanskritologist, when he investigated the sites of this civilization at Gumla, seven miles from Dera Ismail Khan (Dani 1971:1-77). In fact Dani identified six cultural periods and Farzand Ali Durrani, who excavated Rahman Dheri which is fourteen miles north of Dera Ismail Khan city, provided more details about the extension of this civilization in the North West Frontier Province (Durrani 1981:133-137).

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Archaeologists disagree whether the Kot-Diji type of cultural artifacts constitute a separate civilization or an early phase of the same civilization. Rafique Mughal, citing evidence from the excavations at Bahawalpur and Cholistan, concluded that 'all Kot Diji-related sites *together* constitute an Early Harappan or early urban, formative phase of the Indus Civilization' (Mughal 1981:35). However, Parpola argues that the term is misleading because it 'suggests discontinuity, like pre-Aryan vs. Aryan' (Parpola 1994:21). In fact, many scholars treat the latter culture as a changed form of the earlier one. This is significant because, if the dates of the Indus Valley Culture are approximately 2300-2000 B.C, and the dates of the Kot Diji one are 3300-2800 B.C., then the length of the period of urban civilization in South Asia have been pushed back a thousand years. The area of the early culture is given by Mughal as follows:

> ... the central-northern areas of Baluchistan, the greater portion of Sind and the Punjab, Kalibangan on the Indian side, and the south-western part of the Frontier Province are the regions which are likely to have been comprised within the limits of the Kot Dijian culture (Khan 1981: 20).

Thus, one may suggest that the area now called Pakistan had some sort of cultural similarity as early as three thousand years before the birth of Christ. Whether it also had linguistic similarity will be investigated below.

The Language of the Indus Valley

Unfortunately the few symbols on the ceramics of the Kot Dijian culture have not been deciphered. F.A.Durrani, following B.B. Lal and B.K. Thapar, suggests that these symbols may be the beginning of writing in the Indus Valley (Durrani 1981:130). There are, however, nearly 4,000 specimens of a script from the Indus Valley Civilization carved on stone, fragments of pottery and other objects.[1] They have not been deciphered satisfactorily but a history of the attempts at such decipherment is available in Asko Parpola's above mentioned book on the subject (Parpola 1994). Whether these pictographs constitute a 'script' as we understand it is open to

[1] For good Concordance of the texts see Koskenniemi (1979) and Mahadevan (1977).

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question. The Russian scholar, Zvelebil, suggsted that Dravidian speakers from the Harappan civilization preserved some form of their script when they dispersed. B.B. Lal attempted to connect markings on the 'megalithic' potsherds from South India with signs in the Indus Valley script (cited in Zvelebil 1965) but nothing definite can be said about the Harappan script. The script, or at least the pictographs, appear to have been uniform but that is not proof that the language too was one. In fact, as in all parts of the world, the language must have been divided in dialects or area-bound varieties. It is possible, however, that these were varieties of a language belonging to one language family. The question then is what that language family was?

Beginning from Sir John Marshall, who was the first to suggest that the language of the Indus Civilization was Dravidian (Marshall 1924), most scholars have taken the 'Dravidian hypothesis' seriously.[2] Piero Meriggi, a scholar who contributed towards the decipherment of the Hittite hieroglyphs, opined that Brahvi, the Dravidian language spoken even now in part of Balochistan, must be the original Harappan language (Meriggi 1934:198-241). However, Brahvi has changed so much and become so Balochified, as Elfenbein points out (Elfenbein 1966:3), that it cannot give clear evidence of any sort in this case. Another scholar, the Spanish Jesuit Henry Heras, 'turned more than 1,800 Indus texts into "Proto-Dravidian" sentences' (Heras 1953:59) but his decipherment and linguistic theories were not accepted. Later Soviet scholars headed by Yurij V. Knorozov, carried on a very rigorous computer analysis of sign distribution in the Indus texts coming to the conclusion that it belonged to the Dravidian language family (Knorozov *et al* 1981). However, Kamil Zvelebil, also a Russian scholar came to the conclusion that 'the Dravidian affinity of the Proto-Indian language remains only a very attractive and quite plausible hypothesis (Zvelebil in Parpola 1994:60). Indeed, the plausibility of the hypothesis is such that many people, such as Iravatham Mahadevan, a scholar of old Tamil epigraphy, have used it to offer readings of the Indus script (Mahadevan 1970). F.C. Southworth and D. McAlpin used the Dravidian roots to reconstruct the language of the Indus Valley (McAlpin 1981; Southworth 1984). Walter A. Fairservis, another specialist in this area, stated with considerable certainty that 'the Harappan language was basically an early Dravidian language' (1992:23). Even Parpola, after much careful and detailed sifting of

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[2] For an account of the Dravidians see Sjoberg (1971).

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the evidence, opines 'that the Harappan language is most likely to have belonged to the Dravidian family' (1994:174).

The Dravidian Influence on the Languages of Present-day Pakistan

If the Harrapan language family was Dravidian, then the first languages of the area of present-day Pakistan was not Indo-Aryan but Dravidian. Such a claim has been made in an extreme and unsubstantiated form by Ainul Haq Faridkoti, a Pakistani philologist, in his several publications (Faridkoti 1972;1992).

Other scholars have used the theory of language 'transfer' or 'interference' first outlined by Weinreich (1953) and then used to explain 'substrate influence on creole phonology' by Holm (1988:107) and language contact in general by Thomason and Kaufman (1988).

The insights developed by the study of contact languages suggest that the Harrappan language, which was probably Dravidian, left its influence or "substratum' on old Aryan. Thus Emeneau suggests that retroflexion and other Dravidian features in Indic Lanuages involves Dravidian substratum interference (1954).

Another clue may be the existence of consonantal clusters in the beginning and end of words in Iranian, European , Dardic languages and even Sanskrit. Thus Sanskrit has /p r e m/ which means love. But Hindi-Urdu speakers call it /p ɪ r e m/. They insert the vowel /ɪ/ between the two word-initial consonants /p/ and /r/ because their own rules of pronunciation (called phonological rules) do not allow word-initial consonantal clusters. Similarly, speakers of Urdu, Punjabi and Sindhi separate consonants in word such as 'school', 'stool' and 'small' etc (Rahman 1991:83-95). It may be that this splitting of consonantal clusters comes into some of the languages of South Asia from languages older than Sanskrit. This, however, is a suggestion by the present author which needs much research by linguists for substantiation.

The Coming of the Indo-Aryan Languages

Contrary to the popular myth in Pakistan, the Aryans did not roll down the northern mountains like a tidal wave carrying all the Dravidians before them[3]. According to some scholars they came in

[3] For the views of the scholars who reject the Aryan invasion theory see Nayak & Gosh (1992) and especially Frawley (1994).

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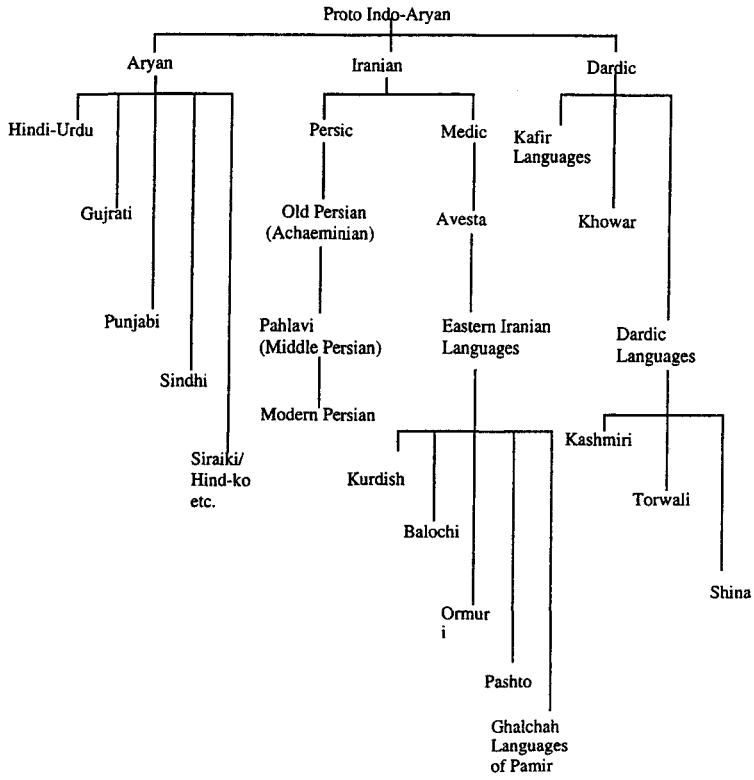
Figure No. 1



Note: This chart is abstracted from Grierson: 1927:120.
The languages not used in Pakistan have generally been left out.

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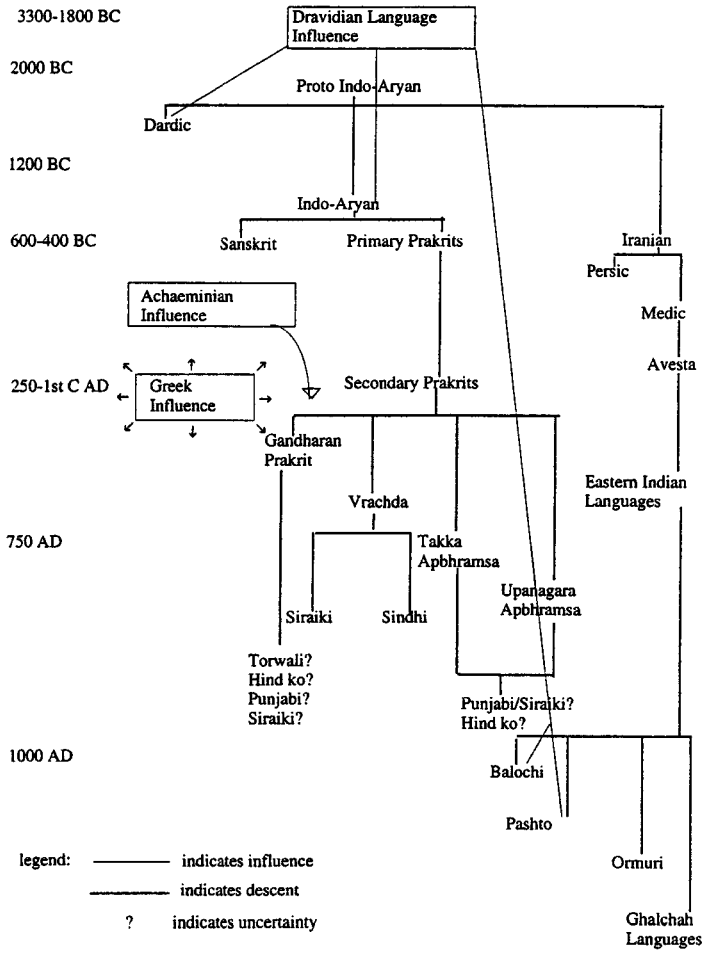
Figure 2



Note: This chart generally leaves out the languages not used in Pakistan.

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at least two major waves in Pakistan as well as small trickles. The first wave came 'around 2000 B.C, and the second some six centuries later'. After the second wave, when they became dominant, their language too spread over northern India. It is this language, or rather a number of dialects, which we call Old Indo-Aryan for convenience. The language of the first wave, which remained confined to the Pamir mountains of Pakistan, is identified as Dardic while the second one may be called Indic (Allchin & Allchin 1982:301-303). The chart given in Figure-1, based on George Grierson's classification, may be useful in illustrating the hypothesized relationship.

This chart does not take the Dravidian element into account (see Figure 2 for it) but it cannot be ignored in the face of considerable evidence (Emeneau 1954, 1956). The evidence of such an element is clearer in vocabulary than in syntax or pronunciation. For instance there are Dravidian loan words in the Rigvedic language. A list of such words is given in Burrow (1973: 378-388). Even commonly used words such as /mor/ (=peacock), *phála* (=fruit), and *kana* (=one-eyed) are probably from Dravidian sources (Emeneau 1980:180). The number of Dravidisms -- in all aspects of the language including phonology -- increased in the post-Rigvedic era. According to Burrow:

> The large majority appear first in the classical language, but in its early stage, being first recorded in Panini, Patanjali, Mahabharata, Srautasutra, etc. The majority appear also in Pali, which is important for dating since these canonical texts take us back to a period from 500-300 B.C. (Burrow 1973:386).

According to Parpola, by 1800 B.C 'Mohenjo-daro was abandoned' and a 'cultural fragmentation in the Greater Indus Valley' took place (Parpola 1994:24 & 26). When this happened the Harappan language remained as a substratum in the language of the Aryan civilization of the Indus Valley of about 1200 to 1000 B.C when the *Rigveda* was largely composed in the plains of the Punjab (Woolner 1931:549-554).

The Sanskritic Legacy

Sanskrit became the elitist language of the Indus Valley from about 1000 B.C and remained in use in some domain or the other,

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generally religion and the state, till the Muslim conquest when Persian took its place. Thus, although the Prakrits which finally changed into the vernacular languages of the people of present-day Pakistan were simultaneously in use as I will argue later, let us look into the development of Sanskrit first. The *Rigveda* itself gives importance to language which is personified as a goddess (Itkonen 1991:6).

Indeed, the Sanskrit concept *Vāc*, Translated as the Word, is the source of the universe in several interpretations of the Vedas. According to André Padoux.

> *Vāc*, the female energy principle, is therefore the life of Consiousness, the very energy of Śiva. She is, within Śiva, the Power, or the Word, better still the Energy-Word taken at its source, the power through which he creates, maintains, and withdraws in himself the universe. Thus the Word, right from the first principle, appears as an aspect of Consciousness. Consciousness is inseperable from the Word because it is alive;...(Padoux 1990:78).

Thus, language was sacred; it was not a means to an end but above all mundane means and ends. Thus, says André Padoux, India was 'a land where grammar went so far as to be considered as one of the *darśanas* - "views" on the world, which are at the same time paths to salvation - since it helps to preserve and understand primeval revelation which embodies the whole truth and is given in the form of sacred formulas (mantras) - and through which expresses itself - the *brahman*, which is both transcendent Reality and Supreme Word' (ibid. 1-2).

With such a view about language, linguistic change was seen as corruption. But all living languages change and the spoken languages of the people, the Prakrits, changed all the time. This threat was countered by making grammatical rules which would petrify language. The most well known of this set of rules was made by the great grammarian Panini who was born at 'Salatura' which is about twelve miles from Jahangira near the Attock bridge in the North West Frontier Province of Pakistan. In those days this village was part of Gandhara which, according to Panini, comprised 'the valley of the Kabul river, with its frontier outpost at Takshasila' (Agrawala 1953:37). Panini's grammar contains about 4000 rules which were memorized and orally transmitted 'for a couple of

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hundred years' and was not written down at all. (Itkonen 1991:6). So sacred was the language of the religious texts, Sanskrit, that the grammar itself acquired a central and almost sacrosanct place in the education system of the Indus Valley Aryans (Stall 1972:11-17).

Since Panini lived in what is now Pakistan it was the speech of the elite of this region that was considered 'correct' and it was this that he wrote about (Itkonen 1991:12). There are, indeed, passages in the Sanskritic texts which bear this out. The following quotations from them are in Hock's translation:

> (1) In the northern region, speech is spoken particularly distinct(ly). People go to the north to learn speech. Or if someone comes from there, they like to hear/ learn from him ... For this is known as the region of speech (*Kausitaki-Brahmana* 7.6).
> (2) Through Pathya Svasti they recognized the northern quarter/ region. Therefore there speech speaks better, among the Kuru-Panchalas. For she is really speech (*Satapatha-Brahmana* 3.2.3.15) (Hock 1993:217).

Panini was not memorized in isolation. Katayayana (c.250 B.C) and Patanjali (c. 150 B.C), who wrote commentaries on his work, were also part of the canon which aspiring scholars at great centres of Brahmanical learning like Taxila had to learn (Stall 1972:11-17).

The Emergence of the Prakrits

In all probability the Indo-Aryans did not speak one uniformly standardized language but mutually intelligible non-standardized dialects. The process of standardization must have been started by the Brahmins earlier but Panini perfected it in about 400 B.C so that this polished (*samskṛita*) language did not change and was considered superior to the ever-changing dialects which were spoken by the people. As the elite looked down upon the uneducated people, it also held their languages in contempt. That is why villagers and people of inferior castes or occupations speak Prakrits in classical Sanskrit dramas whereas the "higher" characters speak Sanskrit (Katre 1964:25-26). Thus the Prakrits were a sign of rusticity and illiteracy as the languages of the ordinary people are even nowadays. But the term *prakṛti* means 'root' or 'basis' according to Katre who suggests that they existed as the original languages of the people (the

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root or basic languages) when Sanskrit was standardized (Katre 1964:2). It is in the light of this insight that we can study the development of the Prakrits into the vernaculars spoken in Pakistan today.

According to George Grierson the Primary Prakrits were living languages in Vedic days. Later they were also fixed by grammarians who wrote their grammars and the living languages of the people were called Secondary Prakrits or 'Śauraseni'. When even these were fossilized by grammarians the Tertiary Prakrits or 'Apabhramaśas' were born. By 1000 A.D even the tertiary Prakrits became dated and from this time onward, as we shall see, the modern Pakistani vernaculars emerged (Grierson 1927:121-126). But before we come to the actual emergence of the Pakistani languages let us look at the language of Gandhara.

The Language of Gandhara

According to A.H.Dani 'the new cultural trends of the centuries were identified in the Swat, Dir, and Peshawar valleys, and because of its original location in that area, it was termed "Gandhara Grave Culture"' (Dani 1986: 38-39).[4] This region was inhabited by the Dasas who worshipped the snake and must have spoken the Indus Valley's Dravidian languages(s) before the Aryans established their supremacy here (ibid 35). By the first millennium B.C, however, 'the Aryanization of most of the population of the northern areas of the subcontinent was complete' (Gankovsky 1964:54). The elite used Sanskrit as we have seen but the common people used what scholars have called 'North-Western Prakrit' or the 'language of Gandhara' (Konow 1936:503-612). This language, opines Gankovsky, was probably made up of elements from the languages of the 'local pre-Indo-European population and Indo-Aryan tribes, as well as the Dardic and East-Iranian ethnic elements' (Gankovsky 1964:58).

Among the pre-Vedic languages the Dardic languages of the first wave of Aryans who settled down in the Pamir mountains were mentioned earlier. These languages influenced the Indo-Aryan language of Gandhara as the language of the *Gandhari Dhammapada* bears out. This Buddhist text was written in the Kharoshthi script, which was derived from Armaic and will be dealt with in more detail

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[4] Taxila, on the Eastern end of the Gandharan civilization which covered part of present-day North West Frontier Province of Pakistan was excavated by Sir John Marshall (1921).

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later, and was discovered in the Chinese Turkestan. The date of this text is c. 269 A.D. and the language:

> agrees closely with the (Post-Aśokan) Kharoṣṭhī Inscriptions from N.W.India and (slightly less closely) with the Prakrit version of the *Dhammapada*. Moreover, it shows sufficient characteristics in common with the modern Dardic languages to be assigned definitely to that group, and among these languages it would seem to be most closely allied to Torwali' (Katre 1964:33).

Torwali is still spoken in the Kohistan region of Pakistan. But Dardic is not the only influence on the Gandharan language. Another influence was Persian.

The Persian Influence

This was hardly surprising because the Gandhara region was ruled by the Persians some time in the sixth century B.C. This is evidenced in the inscriptions of Darius in which 'clear mention has been made of *Hi (n) du,* that is, the Punjab territory, as a part of the realm' (Gupta 1958:33). Further evidence comes from the discovery of an Armaic-Greek inscription of Asoka, the great Buddhist ruler of around 250 B.C., a few miles west of present-day Kandahar in April 1957. Carratelli, writing on this discovery remarks:

> ... the region had been an old Iranian province and it is logical to assume that the tradition of the Achaeminian state language was maintained. Satrapal offices must have survived during Macedonian domination (when Greek was added) and continued their use of Armaic when the Mauryas took over. The importance of Armaic for administration purposes in the former Iranian provinces is borne out by the Taxila and the Pul-i-Durunteh inscriptions (Carratelli & Garbini 1964:12).

Armaic 'came to the fore' at 'the time of the Assyrian empire and became the principal means of communication in the Persian empire' (Garbini 1964:61). It was a kind of *lingua franca* in Gandhara and Bactria (part of present-day Afghanistan). King Ashoka (spelled as Asoka by other writers) used it presumably because the people of

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Kandahar at that time understood Armaic. However, as Gankovsky points out, the common peoples' language did not become Persianized (Gankovsky 1964:70). Even so the script in which their Prakrit was written came from the Persian empire: it was Kharoshthi.

This script, like other Middle Eastern scripts, was written from right to left and A.H. Dani gives the values of its symbols in Arabic letters in his *Kharoshthi Primer* (Dani 1979). The script was used not only by the Iranian kings who ruled this part of the world but even by the Mauryas who succeeded them. In fact the script of the famous edicts of Ashoka at Shahbazgarhi and Mansehra (Pakistan) is Kharoshthi whereas the edicts in the rest of India are in Brahmi (Sircar 1957:29-30). This script was 'mainly prevalent in the places which are known as the North Western Province, the Punjab and the Ganges-Jumna Doab roughly from the third century A.D.' (Gupta 1958:V). Latter the script remained in use in Chinese Turkestan for at least a century. But, whatever the script, the edicts of Ashoka are in the Prakrit of Gandhara and not in an Iranian language. Before we go on to the language of Sind, let us look at the Greek influence on the area we now call Pakistan at the linguistic level.

The Greek Influence on the Languages of Ancient Pakistan

The Urdu word for Greek is *Yunani* (*Yunani Tib* = Greek medicine). This is 'derived from the Persian Yauna, meaning Ionian' (Woodcock 1966:23). As the Ionian Greeks -- the Greeks settled in Ionia which is present-day Turkey -- were the first to be encountered by the Persians, they called them, and by extension all Greeks, Ionian or *Yunani.* From this root comes the Sanskrit word *Yavana* which one encounters in ancient Sanskrit sources including Panini's grammar. Thus, according to Agrawala, 'the yavanani lipi was known only in Gandahara and the north-west at Panini's time' [*lipi* = edict] (Agrawala 1953:466). This is not surprising because there were Greek settlements in the Hindu Kush even when Alexander entered that area in 327 B.C. Although Alexander did not stay long in India, he left his representatives and the Greeks established their rule in Bactria.

By the third century B.C. the Mauryan kings (ruled c. 317-180 B.C.), of whom Ashoka was so illustrious an example, were losing their grip over the northern part of the subcontinent. The Greek kings of Bactria now seized the Western provinces of the Mauryas and by 180 B.C. the Greek language came to be used in some domains such as coins. King Menander (d. 130 B.C) inherited 'western

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Punjab and Gandhara up to the Indus, with its capital at Taxila' (Woodcock 1966:97). Under him 'Pushkalawati -- present-day Charsadda near Peshawar -- began its period of prominence as a Greek centre' (ibid 107). Since the coins of these Greek kings bear Kharoshthi -- and sometimes Brahmi -- inscriptions, it is evident that this script was never suppressed. Similarly, the local languages continued to be used (ibid 88). However, Greek too found a place of prominence and came to be used at least in the elitist domains. According to Woodcock:

> For at least a century and a half, in fact, Greek remained not only the commercial but also the patrician lingua franca of the Kabul valley and of Gandhara at least as far as Taxila. Merchants and kings learnt it as a matter of course, as is shown by the experiences of Appolonius of Tyana when he journeyed to Taxila in 44 A.D. (ibid 130).

By the middle of the first century B.C., Greek rule in Gandhara had come to an end except for an enclave around Peshawar. The Sakas, who were from Central Asia and spoke an Iranian tongue, came to rule Gandhara by 32 B.C. (Chattopadhyaya 1955:8 & 31). Later they left their original language and became strong supporters of Sanskrit (ibid 72). They did not, however, stop the use of Kharoshthi or the Greek language altogether. In fact 'the local Saka ruler of Ujjain' sent a letter to Augustus Ceasar in 24 B.C. in Greek (Woodcock 1966:144). The Saka kings also inscribed Greek legends, as well as Kharoshthi ones, on their coins. It is also reported that 'the women of Surastra continued to use the Greek form of greetings' for quite some time (Chattoppadhyaya 1955:87). The Sakas did, however, become Indianized and language reflects this. According to Chattopadhyaya:

> The inscriptions of the successors of Rudradaman are also mostly written in Sanskrit. On the contrary, the inscriptions of the contemporary Satavakanus are written in Prakrit, which seems to have been the language of the common folk. The later coins of Damaghasada, son of Rudradaman, are in pure Sanskrit, and the use of Sanskrit legends on the coins was continued by his son Satyadaman also (ibid 70).

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Rudradaman ruled about 130 A.D. and it was during his reign that the 'Sindhu-Sauvira region', which, as we shall see in more detail later, has been identified with modern Sind and the lower Pakistani Punjab, was conquered from the Kushanas who had been ruling it earlier. In short, around 200 A.D. Sanskritization was being encouraged at the highest level and classical Sanskrit drama was developing (ibid 70-72). By 295 A.D. the Sakas were subordinates of the Iranian Sassanid kings and by 400 A.D. they had been replaced by the Gupta kings who also patronized Sanskrit.

According to A.H. Dani, Gandhara and the Punjab were ruled by three families by the third and the early part of the fourth century A.D. The Kidara Kushanas too penetrated up to the Hindu Kush and may have acknowledged the suzerainty of the Sassanians or Chandragupta Vikramaditya (ruled c. 375-413 A.D) (Dani 1986:74-75). The point which is relevant for us is the increasing Indianization as Brahmi replaces Kharoshthi on coins and non-Buddhist Indian religions replace Buddhism and Jainism which had favoured the Prakrits initially. The White Huns even destroyed Gandhara, a centre of Buddhist civilization, in 450 A.D. (Beal 1884:C) and Sung-Yun, the Chinese traveller who visited this area in 520 A.D., found Taxila being ruled by Mihirakula (d. circa 532 A.D.) who worshipped the Hindu deity Shiva and used the Brahmi script[5] In the 8-10th centuries, opines Dani, 'Taxila went into the hands of the Shahis' (1986:78). The Hindu Shahis, who also ruled part of Afghanistan, probably spoke the prevalent Prakrit of the North Western part of the subcontinent. This could be a descendant of the language of Gandhara which Ashoka used about 250 B.C. Let us now come to the language of Sindh which will lead us on to the languages of Pakistan at about 1000 A.D. when Muslim rule was established in this area.

The Language of Sind

Although the Arabs attacked Sindh earlier, it was Mohammad bin Qasim who conquered it and ruled it for about three years (712-715 A.D) before being recalled and killed (Elliot & Dowson 1867a:138-211). The north was conquered by the Turks beginning a

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[5] Sung Yun calls the king 'Lae-Lih' and says he 'loved to worship demons'' (Beal 1884:C). Dani identifies him with Mihirakula who worhipped Siva (1986:76).

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little before 1000 A.D. when Mahmud Ghaznavi first entered northern India (Elliot & Dowson 1867b; Firishta 1611). However, for many centuries before the Muslim conquest, the cultural development of the northern and southern parts of Pakistan would appear to be different. Even so, it is not easy to assert that Sind has had a different development from the Punjab and the Frontier because it is not always easy to determine the meaning of Sind.

The countries of Sindhu and Sauvira are mentioned in the *Mahabharata* and have been taken to be roughly the present province of Sind and lower (i.e. Siraiki) Punjab. Some scholars, however, consider them 'neighbouring countries of the Punjab' with Sindhu on the west and Sauvira on the east of the Indus (Mirchandani n.d.: 31). A.H. Dani, however, locates Sindhu roughly in the province of Sind and Sauvira, in his opinion, 'definitely lay to the east of the river Indus much higher up.' This leads to interesting linguistic hypotheses which are best given in Dani's own words as follows:

> If we accept this suggestion, it is not difficult to understand why the Sindhi language is confined to the lower Indus while Saraiki is now spoken in much the same area where *Sauvira* is located by Alberuni. With this understanding of the Saraiki-speaking area, we can now say that the very name *Saraiki* is probably a corruption of the original term Sauviraki (Dani 1981: 35-42).

At different periods in history, however, the boundaries of Sind have been shifting. The Achaeminian kings 'of 2500 years ago provide us, in their rock inscriptions, with some thirty names of sixteen Aryan provinces. Among them, we have Hindu (Sindhu) and its adjective Hinduya (Sindhi)' (Jafarey 1981:64-70). The Muslim historians, however, differentiate between Sind and Hind but their Sind extends up to northern Pakistan. For instance Ibn Khurdádba and Al-Mas'údí count Kandahar, Multan and Kanauj among the countries of Sind (Khurdádba c.10C:14; Mas' u´di´ c.10C:19). Rashid ud Din, whose work is based upon Al-Beiruni, says:

> Hind is surrounded on the east by Chín and Máchín, on the west by Sind and Kábul, and on the south by the sea. On the north lie Kashmír, the country of the Turks, and mountain of Meru (Dín 1310:45).

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But Kashmir, according to the evidence of Hsien Tsiang, appears to have been larger than it is now. Around A.D. 640, even the Punjab -- or some part of it -- was a dependency of that kingdom as king Kanishka ruled there and Taxila (Ta ch'a shi lo) was a 'tributary to kia-shi-mi-lo (Kasmir)' (Beal 1884:177;136-137;143). This evidence suggests that, for some centuries before the Arab conquest of Sind and Multan and about three centuries after it, we should look for one kind of cultural development in Sind and another kind in Kashmir, parts of Punjab and the North West Frontier Province. In Sind the Rai dynasty and then the Brahmin Chach's line held sway till the eighth century. In Afghanistan and part of Punjab the Hindu Shahis ruled till the Turk Subuktagin defeated Jayapala around 992 A.D and wrested away all the territory west of the Indus including Peshawar (Ray 1931:84). In Kashmir a certain Muslim Rajput adventurer called Shah Mir (also called Shams ud Din) ascended the throne around 1339 A.D. (ibid 180). By this period the indigenous languages of Pakistan were emerging.

The Languages of Pakistan on the Eve of the Muslim Conquest

One of the factors which make it difficult to ascertain the names of the languages of the subcontinent is that the Muslims used to refer to all these languages as Hindi, Hindui or Hindawi. For instance, according to Al-Badāoni, the Commander of the fort of Kálinjar 'composed a poem in Hindí in praise of the Sultán [Mahmud], and sent it to him' (Badāoni 17C:26). Later, in the reign of Mahmud's grandson, the poets Masʿúd Saʿd Salmán and Ustád Abul Faraj Rúní both had poetic collections of verse (*diwans*) in Hindi as well as Persian and Arabic (ibid 51-55). Both these poets lived, at least for some period of their lives, in Lahore around 1114 A.D. and if they wrote in the language of Lahore it could hardly have been what we now understand as Hindi. Badāoni also tells us that Shamsu-d-Din Iyaltimish 'with the assistance of Hindú pundits translated 32 stories about him which are a wonder of relation and strange circumstance, from the Hindui into the Persian tongue and called it *Náma-i-Khirad Afzá*' (ibid 95). As this book has not been discovered so far it is impossible to say whether the original was from Kalidasa's Sanskrit as George Ranking, the translator of Badāoni's history, suggests or some Prakrit work (ibid 95 f.n.b). Another work called the *Mujmalu-t Tawáríkh* was, however, translated by Abú Sálih bin Shu'aib bin Jámi 'into Arabic from the Hindwání language' in 1026 A.D. Here by

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'Hindwáni' it is probably Sanskrit which is meant (E.M. Reinaud in Elliot & Dowson 1867a:100).

The Muslims did, however, know the differences between some of the Indian languages and despite the generic use of the term Hindi, referred to these differences in some writings. Al-Mas'údí tells us, for instance, that 'the language of Sind is different from that of India', (Mas' údí c.10C:24) while Ibn Haukal tells us that after the Islamic conquest 'the language of Mansura, Multan, and those parts is Arabic and Sindian. In Makran they use Persian and Makranic' (Haukal 1193:39). In short the Sindhi language had been identified as a distinct language a little after the Muslim conquest of Southern Pakistan.

According to Grierson the mother of Sindhi was Vrachda. It was the spoken language, or Apabhramsa, 'of the country round the lower Indus' (Grierson 1927:125). It was also the mother of what Grierson calls Lahnda and what are now known as Siraiki and Hind Ko (ibid 125). According to the same author 'India had left the Prakrit stage, and had reached the stage of the tertiary Prakrits, i.e. of the modern Indo-Aryan vernaculars, by the year 1000 A.D.' (ibid 125). It is possible then, as A.L. Turner opines, that Sindhi must have separated from the mass of related languages sometime between 250 B.C. and the first century A.D. (Turner 1924:315). John Bordie, using linguistic evidence of loss of certain words per thousand years, suggests that Sindhi and Punjabi separated between A.D.750 to 1400 and that the implosives of the Sindhi language 'came into existence prior to A.D. 1400 and subsequent to the separation of Sindhi from the mass of related languages' (Bordie 1981:277). Since Siraiki too has implosive sounds, it too may have become a separate language around this period. But Siraiki shares its vocabulary, or at least a major part of the core vocabulary, with Punjabi so that the present writer is unsure whether Siraiki is a sister of Punjabi which picked up some features of the Sindhi sound-system (phonology) or a sister of Sindhi which picked up Punjabi words as Grierson suggests.

In Grierson's opinion Punjabi is the descendant of the Takka Apabhramasa of the North Central Punjab and the Upanagara Apabhramasa of the Southern Punjab (Grierson 1927:126). However, the language is not mentioned by this name till after the Muslim conquest. In fact the very term Punjab is from Persian (*Punj* = five and *ab* = water or river). Since five rivers flow in this region the Persian chroniclers called it 'Punj-ab' and the name replaced the earlier names of the region. However, Amir Khusrau, writing in

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1317, calls the language of Lahore not Punjabi but 'Lahori'. Khusrau also mentions Sindhi and Kashmiri but not Pashto or Balochi. It is Abul Fazal who mentions 'Afghan' (Pashto) in the *Ain-i-Akbari* in the sixteenth century (ibid 1; Fazal c.16C:1036-1037).

In short, Sindhi, Punjabi, Siraiki and some form of Hind Ko as well as the Dardic languages were spoken in some form or the other in the area now comprising Pakistan. Pashto and Balochi are not part of this article since they were only on the fringes of the boundaries of present-day Pakistan in the tenth century when the Muslim conquests took place. However, they will be mentioned in passing here. According to Gankovsky the Pakhtuns moved in the plains of Peshawar, Kohat and Bannu in the thirteenth and fourteenth centuries, to Swat, Kurram and Panjkora as well as to Zhob, Loralai and Quetta in the fifteenth and the sixteenth centuries (Gankovsky 1964:130). The Baluchi language, which too is descended from the Iranian branch of the Indo-European languages, is a late comer in its present location. However, in the tenth century when the Arabs ruled parts of Baluchistan, they occupied Kalat which was probably Brahvi-speaking even then (Haukal 1193:32-33). Baluchi too may have been present on the peripheries but it spread all over Pakistani Balochistan and elsewhere with the raids of the Ghaznavids and the Ghorids (Gankovsky 1964:147). The development of the languages of present-day Pakistan into the beginning of the Muslim conquest may be described more accurately in Figure 2 than in Figure 1.

Conclusion

The Indus Valley, which is present-day Pakistan is heir to some of the most ancient civilizations of the world. Its languages, which were part of the culture of the people of this region, too have ancient roots. These languages have not generally been used in the domains of power because the rulers of this region were generally foreigners. But the foreigners -- whether Achaeminian Iranians, Greeks or Muslim Arabs, Turks and Pathans as well as the British -- have also enriched the indigenous languages so that their vocabulary is multilingual and varied. As the people of this area converted to Islam the Arabic and Persian words became part of their Islamic identity and remain so. In a sense it is their very presence as well as the Arabic-based scripts of all present-day Pakistani languages which give them a kind of cultural unity. Linguistically, then, Pakistan faces two directions: India - because the roots of its languages are Dravidian as

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well as Indo-Aryan; and the Middle East - because its scripts and vocabulary owe much to Arabic and Persian.

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Heaven and Earth in Ice Age Art: Topography and Iconography at Lascaux

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In the cave of Lascaux, figures of aurochs have a preponderant presence that is atypical of Upper Paleolithic cave art. The author refers this fact to the characteristic natural features of the cave: figures of aurochs relate to the domed and vaulted ceilings of the spacious, lofty galleries of the grotto. In striking contrast to this pattern, the relatively few painted bison are found in deep shafts, narrow tunnels and ground-hugging niches. This clear and consistent dichotomy of aurochs and bison is compared with the near-universal concept of the sky and the earth as basic elements of cosmogonies: aurochs represent the sky, bison the earth.

Many writings about Magdalenian cave art evoke a picture of the artists as half ape-men, almost incomprehensible beings, intellectually and emotionally far removed from modern man. It is small wonder, then, that interpretative analysis of paleolithic art has been at a standstill for decades. Assuming that paleolithic artists devoted their creative energies to intellectual hokus-pokus ("hunting magic," "fertility magic") or to elementary ("cognitive") notation, interpreters have blinded themselves to the obvious: that artistic traditions of the Upper Paleolithic were perpetuated by artists of later, historical periods.

I shall illustrate my point with a brief study of a special case, namely, the distribution of figures of oxen at Lascaux according to a pattern that is meaningful in light of historical concepts. While this represents but one of many motifs in the richly decorated cave, it is one that stands out as a constitutive element of the imagery.

The frieze of large white bulls in the Great Hall of Lascaux has

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received more attention than virtually any other ensemble in cave art, partly because of the extraordinary size of its figures, partly because it elicits an intuitive – however vaguely recognized – sensation of an implied meaning. More precisely, I shall argue that it is a pictorial representation of the sky, comprehensible in terms of later, well-known myths about the structure and origins of the universe.[1]

Let us first consider the hall itself, for its appearance to-day is essentially like it was when the painters first entered it between 15,000 and 20,000 years ago.[2] Variously named the Hall of the Bulls, the Rotunda of the Bulls, or just the Rotunda, it is a vast oval chamber, approximately 55 feet long by 30 feet wide ("A" in fig. 1 a); it presents the entering visitor with a broad panorama in which the back of the hall forms the curve of a sweeping U-shape. The walls are also curved on the vertical plane (see the cross section, fig. 2), arching inwards at the top to form a dome-like cover that has been compared to the interior of a boat turned upside down; the peak of the dome-shape is nearly 20 feet above floor level. The overall feeling of the room is thus similar to that produced by a domed rotunda--not as perfect as later man-made structures, but impressive by its regularity within the highly irregular and endlessly varied realm of limestone grottos. With its walls and ceiling smooth and evenly arched (protruding boulders at the apex, notwithstanding), and its coating of shining white calcite that reflects light from countless glistening crystals, the Rotunda suggests the appearance of the heavens (in the same sense that the golden domes of medieval churches suggested the heavens and were decorated accordingly).

This vaulted sky-world is set off from the bottom zone of the

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[1] This realization was the subject of an article written a quarter of a century ago for a Danish art magazine (Christensen 1970). Though that article contained ideas long since abandoned, it did outline the sky-earth dichotomy in upper paleolithic iconography along the same lines as the present study.

[2] Alterations made since the 1940 discovery are well documented. We are fortunate to have thorough descriptions of the grotto (including the remote zones where few visitors ever went) by scholars who were allowed time and opportunity to explore the galleries. This article is particularly indebted to Annette Laming's report (1959).

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walls and the floor below by a pronounced horizontal ledge – the "horizon" below our "sky" – delineating the upper border of a dark brown, roughly surfaced rock projection that runs all around the hall (cf. fig. 2). In contrast to the light-colored dome above the visitor's head, this dark bank resembles the clay covered floor on which it rests. It is not hard to imagine the Magdalenian artists' delight in the discovery of this ready display of dual celestial and terrestrial realms, and we shall proceed by assuming as our working hypothesis that this dualism of an upper and a lower zone indeed was conceived by them as a display of two elementary, virtually "archetypal," components of cosmologies worldwide, the sky and the earth.

We should, of course, not imagine a Magdalenian visitor viewing the Rotunda and its decoration in the spirit of a modern person visiting a planetarium; not a scientific/educational, but rather a religious/mythical experience may be assumed. That, however, does not imply that the creative process is entirely elusive; in fact, holes left at the bottom of some walls in the major galeries prove that the artists went to considerable effort in constructing scaffolding so as to take full advantage of the vaulted ceilings of the cave (Ruspoli 1986, 126, 143; Leroi-Gourhan et Allain 1979). What they achieved is familiar from countless reproductions of the paintings of the Rotunda:[3] a long frieze, stretching around the curved walls, reaching from the rock ledge to the ceiling, dominated by five huge figures of bulls, the largest ones ranking among the longest figures in all of Ice Age art (approximating 19 feet). The right-hand part of the frieze, where the walls reach to the top of the ceiling, is entirely devoted to the portrayals of three enormous bulls whose bodies literally absorb the dazzling white of the rockface. Two artistic choices are in evidence: to stretch out the aurochs so that they embody the full expanse of the vault; and, to leave their bodies white (rather than the natural black of the bulls) so that they adopt the bright crystalline

[3] Due to the spherical form of the walls, reproductions of the approximately 75 foot long mural are never satisfying. To avoid severe distortion the frieze can only be photographed a figure at a time; drawn reproductions use a cone projection. (See, Breuil 1952, Leroi-Gourhan 1968, Ruspoli 1986, and elsewhere).

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sparkle of the wall coating. In this way, the bulls become one with the shimmering white of the dome, and in consequence of our working hypothesis about the celestial nature of this sphere, we can conclude that the aurochs represent the sky.

We have, admittedly, no direct proof of the correctness of this interpretation, as there are obviously no contemporary written sources to call upon,[4] but our theory of the significance of the aurochs may prove itself valid to the extent that it can open a way toward a better understanding of further aspects of Magdalenian art. One step in that process may be the search for an animal species representing the earth, since many myths of creation involve the basic configuration of sky and earth (the opening of the *Old Testament* book of "Genesis," to cite but one example). As the aurochs is associated with the celestial Rotunda, we will look to contrasting, terrestrial sections of Lascaux for a pictorial representative of the earth. One candidate to this role recommends itself at once by its conspicuous absence from the inventory of species in the Rotunda, namely the bison, which generally is far more numerous and more universally present in cave art than the aurochs.

French-Cantabrian caves with paleolithic art differ widely by the relative numbers of distinct animal species depicted, and it is a well-established fact that horses and bison stand out as those most frequently and widely shown. At Lascaûx the statistics are reversed as the aurochs outnumber the bison (the horse being present in standard measure). The absence of the ubiquitous bison from the Rotunda provides a clue that there might be a relationship between bison figures and bowels-of-the-earth type locations. And indeed, the topographical distribution of the bison in the grotto is plainly complementary to that of the aurochs, literally closer to the earth.

To find the first painted figure of a bison we must go through a corridor, the Axial Gallery (see fig. 1 a), that is entered via the

[4] Readers unfamiliar with comparative mythology may find this concept odd but aurochs are known to represent celestial phenomena in some early religious texts. It may suffice to mention the Egyptian sky-goddess, Nut, frequently depicted as a huge cow whose star-covered body spans the sky vault.

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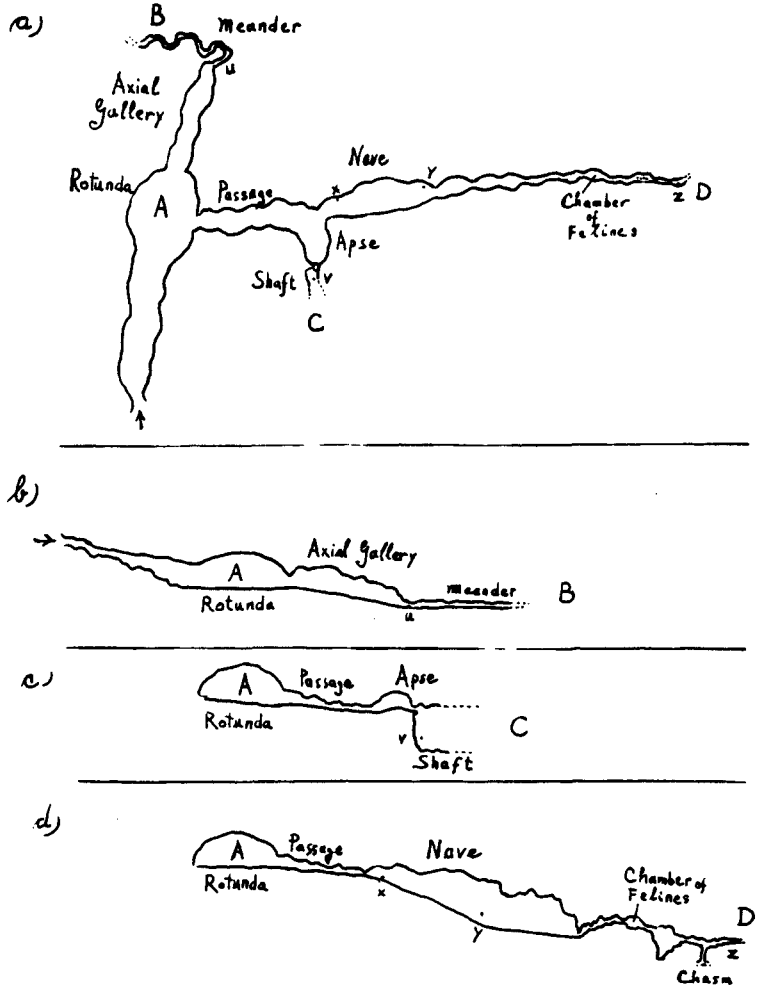

Figure 1.

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Rotunda of the Bulls. At first, the walls here are tall and arched inthe top part like in the Rotunda, and here too, scaffolding was used to paint large aurochs figures that spread across the vaulted ceiling. But at the end of the Axial Gallery the character of the space changes drastically; here the corridor is suddenly reduced to a low and tight tunnel, the winding Meander, that eventually narrows down to preclude further penetration (see the longitudinal section in fig. 1 b). The bison (at "u" on the plan) is located **inside** this gut-like appendix to the spacious Gallery and is executed close to floor level. The contrast between this cramped setting and the preceding, generously vaulted spaces could not be more emphatic.

This experience is repeated as we move further into the cave. To locate the next significant bison image, we must return to the Rotunda of the Bulls and in turn traverse the Passage, a low side-gallery that leads toward the inner cave. The Passage, in which visitors must walk bent over or crawl, lacks the grandeur of the front part of the cave (and of the Nave that follows) and has no monumental paintings. The bison or aurochs found here are fragmentary engravings, none of which stand out from the web of overlapping figures characteristic of this zone.[5] To arrive at the second noticeable bison of the cave we must advance to the lip of the gaping hole, the Shaft, in the back of the Apse, and descend 20-25 feet vertically by means of a ladder (Magdalenians used rope) into a lower level of the cave system. Down here (at "v" in fig. 1 c), we find the famous portrayal of a charging bison (attacking a man with a bird's head), which is the dominant animal figure of the small ensemble painted at this remote spot.

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[5] The art work in the Passage is radically different from that of the Rotunda and the Axial Gallery. It consists of a great number of engravings (and a few fragmentary paintings) that form a puzzling network of interlaced figures. This pattern continues into--or more correctly, emanates from--the small chamber, the Apse, the "Holy-of-Holies" of Lascaux. Between 1,000 and 1,500 drawings in this section of the cave form an often indecipherable web of lines, with the most intense density at the back of the Apse, spreading from there, and spilling out into the low Passage. Though aurochs and bison figures are embedded in this maze of lines, none have the stature to claim the territory, and none seem relevant to the present study.

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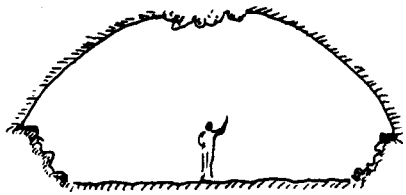

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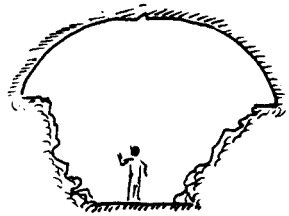

Figure 3.

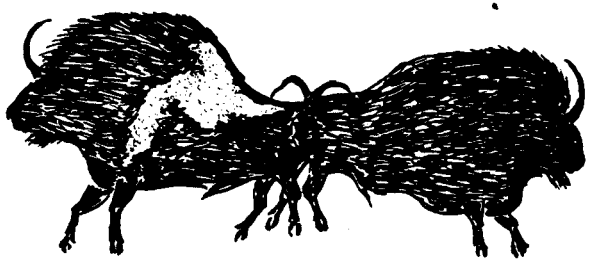

Figure 4.

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The two bison mentioned so far conform convincingly to our thesis of the earth/bison relationship as opposed to the sky/aurochs connection: both are pushed back into recesses, as though banned from the wide and lofty areas reserved for the favored aurochs. This pattern is repeated – though less strikingly so – by the remaining two groups of painted bison, which are located in the Nave. They are characteristically not found on the elevated, white vault, where an aurochs (a black cow) is the highest placed, all-imposing image,[6] but are positioned in niche-like cavities of the rough and blackish socket at the base of the walls (cf. the cross section, fig. 3).

The first bison of the Nave (at "x" in fig. 1 d) is set so low in its cavity that visitors must stoop to obtain a close look (and photographs "flatten" the figure for lack of a good angle). Due to the fall of the floor of the Nave, the last two bison (the "crossing" bison, fig. 4) are at a low point of the cave ("y," fig. 1 d), approximately 10 feet below the black aurochs cow on the vault. They are set in a shallow, concave recess of the bank at the foot of the wall where they are surrounded by dark, roughly shaped boulders. These last paintings in the cave round off the amazingly consistent arrangement of all the painted aurochs and bison.

Shortly after the panel of the "crossing" bison, the Nave reaches its lowest level, and the following section is too damp, the wall coating ("moon milk") too crumbly, for decoration. Eventually the walls close in, leaving only a "cat-hole" through which to access the terminal, bowel-like recesses; these take the form of a low and narrow tunnel with yawning chasms in the floor and with places that must be negotiated on all fours. The decoration back here is found in small alcove-like chambers where artists had to work in uncomfortable positions; remnants of coloration are seen, but all figures are engraved. Researchers have identified nine bison figures in this zone,

---

[6] While an adequate study of color symbolism at Lascaux lies beyond the present article, I might suggest that the black hue of the cow on the vault of the Nave, like the black color of a cow and a bull near the far end of the Axial Gallery, is correlated with the relatively remote locations of these figures, in contrast to the white bodies of the bulls and the red of the cows in the front part of the cave.

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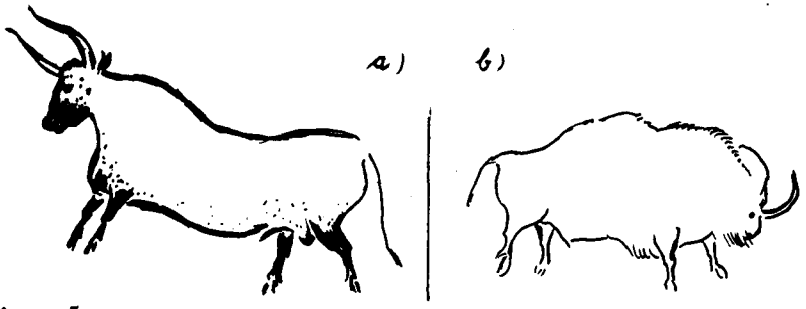

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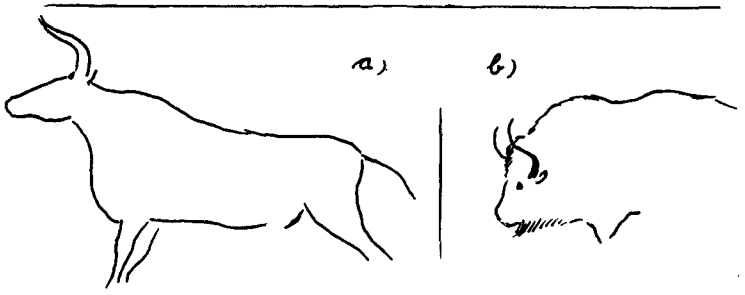

Figure 6.

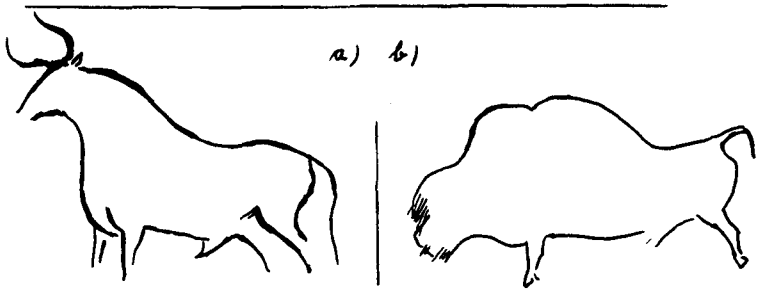

Figure 7.

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which includes the very last figure, located just before the tunnel becomes impenetrable ("z," fig. 1 d).[7] All of this is entirely consistent with our theory regarding the bison and the realm of the earth.

Reconsidering Lascaux as a whole, it is evident that some salient features of the grotto were utilized efficiently by the artists in charge of the decoration. In particular, they exploited the continuous horizontal division of the major galleries: the upper, sky-like sphere of smooth, light and vaulted surfaces; the lower, earth-like bank of corrugated, dark matter along the bottom of the walls; and, the horizontal ledge running through most of the cave separating the two strata. These phenomena, accentuated by the artistic potential of the glorious domed entrance hall, account very well for the preponderance of the aurochs in the decoration of the cave. By its very form Lascaux was dedicated to the glory of the sky, and it remained for the artists to enhance the nature-given appearance, thereby transforming the cave into a sanctuary for a celestial divinity. In consequence of this dedication, the earth-related bison was relegated to areas where wall surfaces drop below the horizontal ledge, notably, the four points at which the cave reaches its lowest level: the Meander, the Shaft, the back of the Nave, and the chasms of the terminal tunnel.

The large-scale execution of the sky/earth theme at Lascaux was inspired by the natural characteristics of the grotto itself, but the thematic associations of aurochs and bison imagery were evidently not *invented* to suit this particular cave; nor is Lascaux entirely unique in its decorative scheme. On a more reduced scale, rather typical of Ice Age cave art, we recognize the basic pattern of the Lascaux decoration at Ebbou (near the Rhone). In this cave, the main decorated chamber contains several panels with relatively large engraved aurochs, and the largest of these, a six foot long bull (near the maximum for paleolithic engravings), is featured on the central

[7] Laming (1959, 92) mentions a "reported" painting of the head of a bison situated low down on the vertical wall of a deep chasm that opens in the floor of the corridor beyond the Chamber of Felines. Few persons have examined this zone, and I have seen no confirmation regarding this figure. It remains questionable.

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wall of the chamber. Among the approximately 70 figures of this hall are only two bison and both are hidden away: one on the underside of a rock projection quite close to the ground and thus invisible from normal eye height; the other – again, close to the floor – in a recess at the far end of the chamber (Chabredier 1975).

A cave dedicated to the sky and the aurochs is, however, only a special application of a general iconographic principle, and a key result of our study may be the consequent realization that aurochs imagery recalls ideas about the sky in any context, just as bison figures in general represent the earth. It is hard to imagine that the two species would carry these connotations only where, as in Lascaux and Ebbou, they are parts of a specific topographical scheme; it is far more reasonable to conclude that aurochs imply the concept of "sky" and bison that of "earth" in Magdalenian art at large.

This is not the place to discuss the many feasible implications of sky and earth as conceptual categories in the thinking of paleolithic artists, but it should be mentioned, in passing, that the aurochs-bison dichotomy seems to be a simple reflection of the most conspicuous physical difference between the two, otherwise quite similar, brands of wild oxen: the aurochs carries its head high, while the bison's hump – as anyone who has looked at a bison, live or in a photo, will have noticed – forces its head to almost hug the ground. Morphologically, the former is related to the sky, the latter to the earth. The artists of Lascaux stayed close to nature in their renditions (cf. figs. 5 a, b); artists elsewhere would at times reinforce the distinctive characteristics for expressive purposes (see the examples from Ebbou, figs. 6 a, b, and Pech-Merle, figs. 7 a, b).[8]

The potential consequences of the iconographic program disclosed above reach far beyond the limits of this article and I shall

[8] The study of distinct iconograhic roles of animal species originated with the writings of Annette Laming and André Leroi-Gourhan 40 years ago, but remains a discipline in its infancy. Ruspoli (1986, 38) correctly observes that figures of aurochs and bison are separated in the cave of Lascaux, but he attempts to explain this fact in terms of the territorial incompatibility of the two species, ignoring both the different character of the settings of the two protagonists within the cave, and the fact that they often *do* occur together in pictorial ensembles elsewhere--as do other naturally separate species.

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mention only one example of the inherent possibilities of the bison-earth equation. The two crossing bison at the back of the Nave at Lascaux (fig. 4) have been explained in terms of the battles between males during the mating season; however, when we relate them to aspects of the earth, they acquire a deeper meaning. Notice that the two figures are posed in strict symmetry and are rigorously similar – with one remarkable difference: a reddish brown patch on the back and flank of the left-hand animal. This design is significant and recurs in a great number of paleolithic animal figures as an indication of molting, the change of fur from the woolly winter coat to the lighter summer coat. In the case of the bison, this was highly visible as the dark brown winter fur came off in lumps, beginning at the back, gradually revealing the new, reddish brown summer coat. Now, if bison embodied the earth, this change of appearance during the spring/early summer change of season would inevitably carry the connotation of the shifting face of the earth, its awakening after the winter with the revival of vegetal and animal life. In this sense, the left-hand bison represents the summer-half of the year, the other the winter-half. This interpretation serves to explain the meticulous symmetry and the almost heraldic strictness manifest, notably, in the execution of the crossing hind legs and tails and the mirror-like reversion of the crescent-shaped horns. It also provides an explanation for the orientation of the two figures: the "winter-bison" is turned toward the dark depths of the mountain; the "summer-bison" toward the outside world of light and life. We might even speculate that their dynamism is related to powers that drive the year through its course.

Still more exciting ramifications of this theme are to be glimpsed when we turn our eyes slightly to the left of the panel of the crossing bison and see a long file of horses, all running – like the "summer-bison" – in the direction of the opening of the cave. Many explanations of these correlated movements are possible but none shall be pursued here as they obviously deserve careful analysis. Not definitive answers but new avenues of interrogation are the likely measure of progress in studies of prehistoric art.

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Essays on Germanic Religion

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Some Problems in the Demography of the Tribal Populations in India

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From the outset, Indian tribal demography has been subject to limitations set by the varying definitions of a tribe, by changes to the list of officially recognised tribes, by qualitative and quantitative deficiencies in demographic data, by administrative changes to India's regions and by the reclassification of tribes as castes.

What there is to say about the difficulties besetting the demographer of India's tribal populations will be a surprise to few. However, a discussion of these well-known problems will serve as an important reminder that official demographic data are the products of politics as well as science.

Certain denoted communities and backward classes of the Indian population belong to a category known as "weaker sections of the people". By the 46th Article of the Indian Constitution (1950), Scheduled Tribes and Scheduled Castes are included in this category. Therefore, the demographic data collected by special State and District officers relating to India's tribes have been of great political importance to issues of the "educational and economic interests" of these "weaker sections of the people" for the last four decades.

Statistical data from the Indian censuses are also made use of by anthropologists interested in the process of social and cultural changes among the tribal communities. They want to understand the impact of national and State policy on tribes and to show the tendencies and tempo of the process of unification of the "lower" strata of Hindu society. This is the process which is known by politicians as "economic and educational development". Anthropologists call it "acculturation".

Let us start with the general problems connected with the

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limitations and interpretations of the statistics relating to tribal populations. There is no official definition of a tribe according to which the list of tribes is compiled by each census (Naik, 1964; Jaiswal, 1979: 5). The famous Article 342 of the Indian Constitution states that the President may specify the tribes or tribal communities, or parts of, or groups within, any tribe, which shall for purposes of this constitution be deemed to be scheduled Tribes (Hasnain, 1983: 150-153) and the Parliament has the right to include or exclude names from the list of Scheduled Tribes. In this way the problem of the definition of a tribe was avoided and left for theoretical dispute by academics. Happily enough some of them were engaged in works on Multipurpose Tribal Blocks.

Lack of the definition resulted in some confusion of figures relating to castes with those of tribes. The situation is complicated due to the process of assimilation of tribes into the Hindu varna-jati system, i.e. caste-system. Many sociological researches, starting from those well-known studies of Bose (1967), Srinivas (1952, 1955), Staal (1963), and Sinha (1965), proved that tribal groups that changed their occupational and religious way of life, and lived in mixed villages, were converted into castes (see discussion Munshi, 1979). To each new caste, Hindu society assigned a particular occupation within a particular region (Bose, 1967: 209).

This concept, combined with simple observations, invoked the division of tribes into some categories (Vidyarthi & Rai 1977: 70-72), mainly three: A - the lowest (as defined) stage of economic development (hunters and gatherers, shifting cultivators), today usually connected with the dying tribes (Chenchu, Birhor, Koya); B - tribes largely assimilated with general society; and C - assimilated tribes (Sanganna, 1966). However, criteria employed by the State officials for classification of categories B and C were varied.

General figures for the size and growth dynamics of India's Scheduled Tribe and Caste population as against the whole are shown in Tables 1. and 2.

From reading the census data one gets a feeling that nobody knows the number of tribes in India. In 1941, 175 tribes were enumerated (Chandra, 1946: 39-44; in: Nag, 1980: 2). In the 1950's

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	1961	1971	1981	1991
All-India population (in millions)	439	548	685	844
Scheduled Tribes	30	38	53,5	N.A.
% to total population	6,8 %	6,9%	7,8%	
Scheduled Castes	64,5	80	108	N.A.
% to total population	14,7%	14,6%	15,8%	

Tabel 1. General figures (source: General Statistical Organisation, 'India in Figures'.1992)

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	1961-1971	1971-1981
Scheduled Tribes	+ 26,7 %	+ 41 %
Scheduled Castes	+ 24 %	+ 35 %
the rest of population	+ 24,8 %	+ 21,7 %

Tabel 2. Decenial variations of population's growth.

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Prasad reported 212 tribes as Scheduled Tribes (Bhowmik, 1971: 5) while the census of 1961 reports 630 scheduled tribes (ibid.:5) leaving an unclassified tribal population of nearly 230,000. So, the apparently high degree of decennial variation of tribal population size is partly explained by the changing list of nationally scheduled tribes during the last forty years.

Misunderstanding has also arisen through enumerating tribes as parts of States. These records possess a high degree of precision but have problems with accuracy. The recorders of the censuses of 1961 and 1971 had such an eye to precision as apparently to have tracked down and recorded 'One Oraon in Maharashtra', 'One Aranadan in Tamil Nadu', again 'One Aranadan in Kerala', 'One Khowa in Nagaland', 'Three Bhattra in Maharashtra' and so forth and yet hundreds of tribal peoples have not been recorded at all. I do not refer merely about the Union territories. The tribe of Kurumba of the Attapady Valley in Kerala has been left out, as have the Cholanaickans of Minmutti Valley. "It is not known", writes Mathur, "whether the Mullakurumans and Uralikurumans have been enumerated together under the name Kurumans" (Mathur, 1977: 5). Another problem is the treatment of single communities as multiple tribes, e.g. Malayarayar and Malai Aryan (ibid.: 5). Similar problems arise in using different names for the same tribe in two or three States, e.g. the tribe of Khond, known as Kond and Kandha; or the tribe known as Korwa in Bihar, Kodaku in Madhya Pradesh and Korna in Orissa; or Savar, known as Sawara in Madhya Pradesh and Saora, Saura and Sahara in Orissa.

There is also quantitative deficiency in data, for example the census of 1961, which was probably the last in which all individual Gond tribes were enumerated (3,992,905). I do not know if the exact figure is available for the census of 1991.

The next set of difficulties in comparing general tribal population data of the century are connected with the changing of Provincial borders (under British rule), and with the changes of Provinces into States in 1948, and with the creation of new states in the 60's.

It is not easy to show the degree correlations of some quite interesting features, such as the relation between tribal religion and

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some demographic indexes (e.g. the number of children). This difficulty is due to the national policy which wants to see tribal communities not as separate unities but as the segments of Hindu society. Therefore in the censuses classification by religion is not tribally specific. The general data for the decennial variations of divisions by religion for the years 1961-1981 are given in table (3).

In conclusion of this part of my paper I shall say that the inferences drawn from generalizations embracing the totality of the fifty or sixty millions of Indian tribal population are often misleading. As has been identified by Haimendorf (1982), there is a need first for concentration on micro-studies dealing with specific tribal societies.

Let's touch upon another problem now, directly connected with the tempo of change of tribal economic independence into dependence. It must be said that the main factor for the acceleration of acculturation (that is, the changing of the way of life of the tribal people) is the combination of deforestation and land alienation. Viegas and Menon have provided us with the data for the deforestation of the 70's and 80's (1985: 327). For 1972-75, satellite photographs show a tree-cover area of 16.8% for the whole of India, while for 1980-82, satellite pictures confirm a tree-cover area of only 14.1%. This means that during this period of time there was loss of 16.25% of tree-cover. According to the Indian Department of Environment, in 1985 there was left only 10.63%. Largely speaking, deforestation is the effect of industrialization. In the State of Madhya Pradesh the exploitation of commercial bamboo increased from 25.967 notional tonnes in 1973-74 to 111.300 notional tonnes in 1980-81, an over four-fold increase (ibid.: 328). Madhya Pradesh has the biggest concentration of tribal population in India. Orissa and Bihar together embrace almost half of the total population in India. In Karnataka the forests (bamboo) resources are nearly finished and the State had to satisfy its timber requirement from another, quite distant State, Arunachal Pradesh (ibid.: 328). It should not be surprising that Karnataka is, together with Uttar Pradesh, home to India's lowest tribal populations.

The same authors write that "a further cause of reduction in the area of forest accessible to forest dwellers is the constant increase of

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	1961	d.v. %	1971	d.v. %	1981 *
Hindus	366,5	23,7	453,4	21,2	549,7
Muslims	46,9	30,9	61,4	23,1	75,6
Sikhs	7,8	33,3	10,4	26,0	13,1
Christians	10,7	32,7	14,2	17,6	16,7
Others	6,8	27,9	8,7	23,0	10,7
Total	438,7		548,1		665,8

Table 3. (Population in millions)

* Figures for 1981 do not include tha data for the population of Assam (estimated 19,9 mln.) where census was not held. Source: GSO, India in Figures, 1992.

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the area forest reserved for the needs of industry" (ibid.: 336). Tribal people have very few rights in reserve forests. At this place, it should be emphasized that the local shifting cultivation which, operating on an 18-20 year cycle, had persisted among many tribals for centuries, had not resulted in any deforestation or soil erosion. The latter effect is given only by the clearing of big areas with whole tree-trunks. Consequences of soil erosion are well known. One is the reduction in the level of ground water, which is for many villages a serious problem (e.g. Koyas, Konda Reddis).

There is no space here to speak of the near past of certain tribal populations of hilly country who lost their land to water-submersion by the construction of reservoirs (1980, lower course of the Godavari river, resettlement of Koyas and Konda Reddis; see Haimendorf, 1982) and dams (Vyas, 1980: 77-100). Among Baiga, Birhor, Khond, Saora and many others as much as one in every ten people does not possess the land for cultivation. Usually they become agricultural laborers (Vidyarthi, 1977: 438).

Finally, I would like to cite Kroeber and Das, who when enumerating the characteristics of a tribe said that its "political organization is broadly based on the principle of primitive democracy, which is characterized by a maximum of equality coexisting with the minimum of authority or control," while the Indian scholar Das added one more criterion that a tribe lacks such economic specialization as would produce and/or nourish a class society (in: Bhowmik, 1971: 2).

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Analysis of Nonmetric Cranial Traits in Recovered Human Skeletal Collections in Albania Under a Model of Isolation by Geographic and Temporal Distance

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This paper analyzes eight nonmetric traits from human skeletons recovered from fourteen archeological sites in Albania, in order to assess the effects of temporal and spatial distance on subpopulation divergence. The analysis was performed under the model of isolation by geographic and temporal distance of Konigsberg. The results generally agreed with the proposed model, but in contrast with it, no significant correlations between median site date and principal component score were found. This finding supports the suggestion of the existence of a high gene flux among Albanian population in space and time. It demonstrates, in addition, their common origin.

Key words: Biological, spatial and temporal distance, prehistorical biological variation.

Introduction

The lsland Model, Unidimensional Stepping-stone Model and the Migration Matrix Method have often been used to assess the relation of spatial and temporal distances to biological ones (Wright, 1943). According to the above models, Konigsberg (1990) has demonstrated that if there is isolation by distance, then the correlation between biological and spatial distance (controlling for temporal distance) should be positive, whereas the correlation between biological and temporal distance (controlling for spatial

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distance) should be negative.

In the present paper, eight cranial nonmetric traits from human skeletons were analysed in order to assess genetic relations among Albanian human populations over a wide range of time. This type of data has been examined before to investigate the above relations based on other models and methods (Dhima, 1984, 1986, 1991).

The archeological sites where human skeleton collections were found have been for a long period of time the arena for important historical events. There is evidence from historical sources on the settlemnts of Illyrians (third millenium B.C.) who were mixed then with autochtonous prehistoric populations. Other data exist, in addition, on Roman (2nd century B.C. - 3rd century A.D.), Slavic (6th - 7th century A.D.) and Turkish (15th century A.D.) invasions. In this context, it was of interest, therefore, to examine the biological variation of these human group-populations, taking into account spatial and temporal distances. Examining the relations between temporal, biological and spatial distances answers indirectly the question whether the above-mentioned populations differed to any marked extent genetically.

Materials and Methods

All the examined observations were nonmetric cranial traits scored within twelve archeological sites from different regions of Albania (Figure 1). The site dates varied from the 13th to the 9th century B.C. to the first half of the 2Oth century A.D. Only in Durres were analysed three skeletal collections belonging to three different periods of time. Table 1 lists the sites, time period, the number of crania analyzed and the observer for each series.

In the present investigation were computed and analyzed the frequencies of the following cranial nonmetric traits: ossicula suturae coronalis, canalis n. hypoglossi bipartitus, canalis condylaris patens, foramen ovale in spinosum confluens, foramen parietale, ossiculum fonticuli posterioris, ossiculum posterolateralis, ossicula suturae lambdoideae. They were determined after the classical nomenclature (Berry and Berry, 1967). Given that all the above traits

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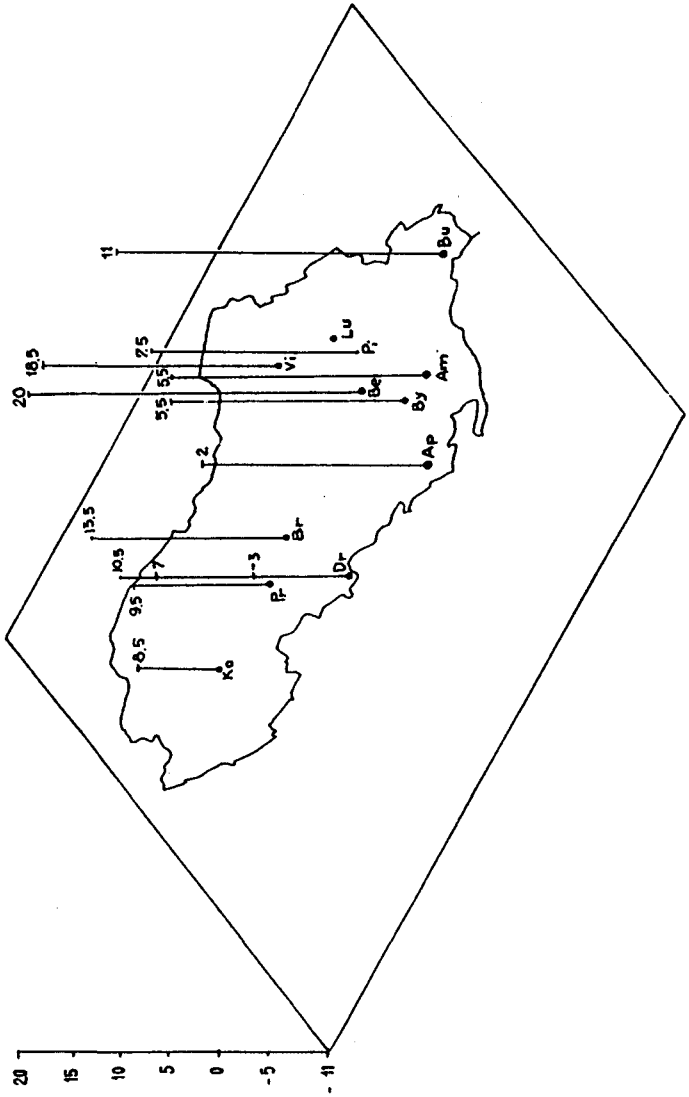

Figure 1. Map of fourteen archeological sites in Albania used in the study. Time is shown in centuries on the z axis. KO Koman, PR Prosek, BR Brrar, DR (D1, D2, D3 Dyrrachium, Durres). VI Vithkuq, LU Luaras, PI Piskove, BE Berat, BY Bylis, AM Amantia, AP Apollonia, BU Butrinti.

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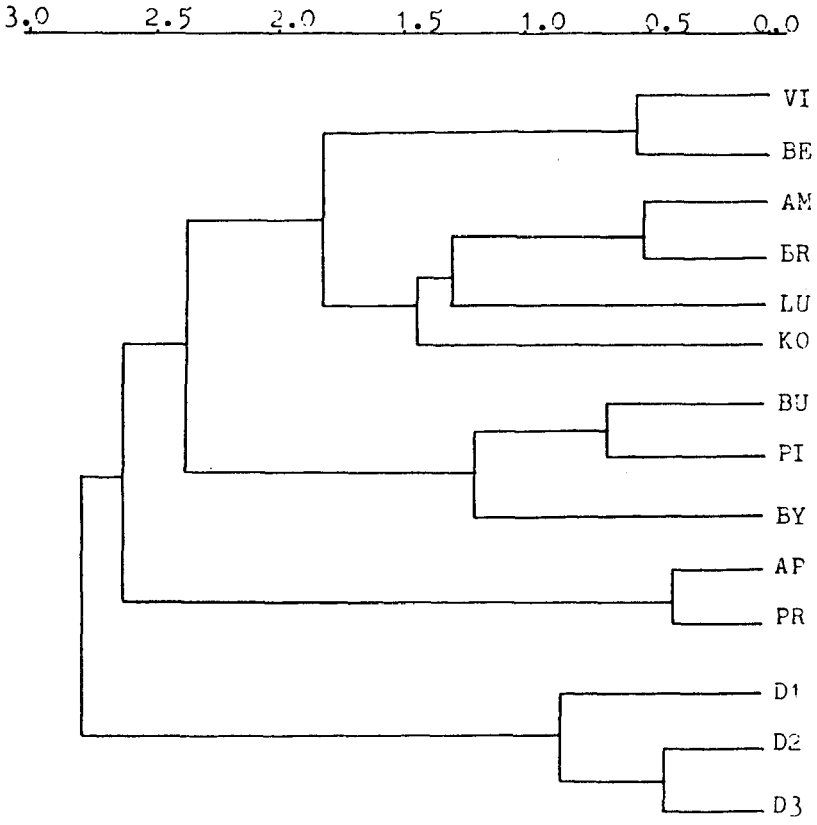

Figure 2. Dendrogram showing the relationships among fourteen populations (representing fourteen archeological sites).

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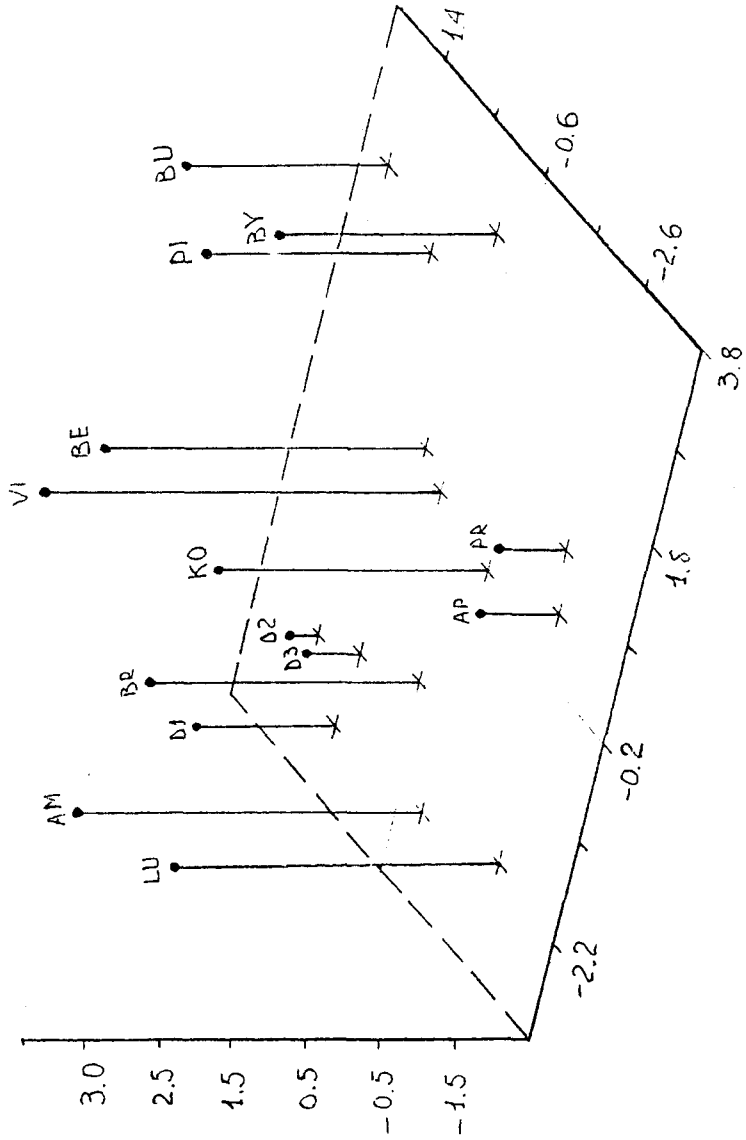

Figure 3. The relationships among fourteen archeological sites scattered in the space of first three principal components.

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Site Name	Abbreviation	Time Period (century)	Number of Crania in Study	Observer
Luaras	LU	13 - 9 B.C.	24 (12♂,12♀)	Aliu S. 1989
Dyrrachium	D1	4 -2 B.C.	17 (11♂,6♀)	Dhima A. 1985
Apollonia	AP	1- 3 A.D.	26 (19♂,7♀)	Dhima A. 1987 Late F.
Amantia	AM	5 - 6 A.D.	16 (11♂,5♀)	Dhima A. 1988 Late F. Dhima A. 1989
Byllis	BY	5 - 6 A.D.	11 (7♂,4♀)	Dhima A. 1986c
Dyrrachion	D2	6 - 8 A.D.	12 (6♂,6♀)	Hoti A. 1987 Miraj L. Hoti A. 1990 Sila A.
Piskove	PI	7 - 8 A.D.	17 (9♂,8♀)	Dhima A. 1981
Koman	KO	7 - 11A.D.	59 (33♂,26♀)	Dhima A. 1988a
Prosek	PR	7 - 11 A.D.	26 (19♂,7♀)	Dhima A. 1989
Butrint	BU	9 - 13 A.D.	14 (6♂,8♀)	Dhima A. 1988b
Durres	D3	10 - 11 A.D.	31 (20♂,11♀)	Bllaca H.1987
Brrar	BR	12 - 15 A.D.	46 (29♂,17♀)	Dhima A. 1987
Vithkuq	VI	18 - 19 A.D.	110(60♂,50♀)	Dhima A. 1986b
Berat	BE	first half of 20th A.D.	113 (77♂,36♀)	Dhima A. 1984 DHIMA A.et al1984

Table 1. The fourteen sites used in the study.

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VI	0.000																			
AM	4.490	0.000																		
BU	4.602	4.334	0.000																	
BE	4.487	3.261	4.684	0.000																
D1	3.775	3.622	4.762	3.800	0.000															
D2	4.057	3.956	4.211	3.879	2.500	0.000														
D3	4.306	3.773	3.653	3.996	2.143	1.592	0.000													
PI	3.554	4.253	4.386	3.812	3.672	3.208	4.044	0.000												
BR	4.225	4.762	4.729	3.681	4.550	3.325	3.847	4.728	0.000											
LU	3.176	3.765	4.410	4.231	3.420	3.759	3.816	4.834	4.139	0.000										
KO	4.585	4.190	4.989	4.524	4.789	3.518	3.975	4.327	4.771	4.121	0.000									
AP	4.467	3.841	4.487	3.947	3.880	3.424	3.722	3.635	4.234	3.335	4.755	0.000								
BY	4.454	5.027	4.541	3.436	3.909	4.117	3.692	4.447	4.884	3.848	4.456	4.286	0.000							
PR	4.047	4.002	4.132	3.911	3.779	2.847	3.221	3.398	3.909	2.980	3.733	1.328	3.604	0.000						

Table 2. Biological distance matrix calcutated with first three principal component's values.

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Principal Component	Eigenvalue	Percent of Variation	Temporal Correlation
1	2.874	35.92	0.339
2	1.984	24.80	0.294
3	1.147	14.33	0.356
4	0.870	10.87	-0.126
5	0.444	5.55	0.052
6	0.365	4.56	-0.301
7	0.241	3.01	0.043
8	0.073	0.92	0.412

Table 3. Analysis of temporal trend for eight nonmetric cranial traits from fourteen archeological sites.

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	VI	AM	BU	BE	D1	D2	D3	PI	BR	LU	KO	AP	BY	PR
VI	00.00	13.00	7.50	1.50	21.50	11.50	8.50	11.00	5.00	29.50	10.00	16.50	13.00	9.00
AM	38.40	00.00	5.50	14.50	8.50	2.50	5.00	2.00	8.00	16.50	3.00	3.50	00.00	4.00
BU	49.00	37.00	00.00	9.00	14.00	6.00	0.50	3.50	2.50	22.00	2.50	9.00	5.50	1.50
BE	29.00	22.00	53.00	00.00	23.00	13.00	9.50	12.50	6.50	31.00	11.50	18.00	14.50	10.50
D1	65.00	53.00	90.00	40.00	00.00	10.00	13.50	10.50	16.50	8.00	11.50	5.00	8.50	12.50
D2	65.00	53.00	90.00	40.00	00.00	00.00	3.50	0.50	6.50	18.00	1.50	5.00	1.50	2.50
D3	65.00	53.00	90.00	40.00	00.00	00.00	00.00	3.00	3.50	21.50	2.00	8.50	5.00	1.00
PI	19.00	23.00	32.00	25.50	65.00	65.00	65.00	00.00	6.00	18.50	1.00	5.50	2.00	2.00
BR	57.00	57.00	91.00	38.50	19.00	19.00	19.00	62.50	00.00	24.50	5.00	11.50	8.00	4.00
LU	7.00	36.50	42.50	31.00	69.50	69.50	69.50	15.00	62.50	00.00	19.50	13.00	16.50	20.50
KO	52.00	94.00	129.50	76.50	45.50	45.50	45.50	86.50	38.00	98.50	00.00	6.50	3.00	1.00
AP	49.00	22.00	59.50	21.00	32.00	32.00	32.00	40.00	40.50	50.00	77.00	00.00	3.50	7.50
BY	36.00	10.50	46.50	12.00	43.50	43.50	43.50	25.50	46.50	36.00	84.50	14.00	00.00	4.00
PR	72.00	75.50	110.00	57.00	31.50	31.50	31.50	80.00	19.50	78.00	20.00	59.00	65.00	00.00

Table 4. Temporal (above the diagonal) and geographical (below the diagonal) distance matrices between fourteen archeological sites.

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were bilateral traits, both sides were scored and used in the analysis. They were, in addition, age and/or sex independent.

The biological distance measure was based on the frequency of cranial nonmetric traits. It was calculated as the Euclidean distance between all archeological sites in the space of the first three principal components.

All the analyzed archeological sites were clustered according to the Unweighted Pair-group Method (UPGM) after Sokal and Sneath (1963).

Geographical (or spatial) distance was measured as the straight-line distance recorded in kilometers between any given pair of sites. Temporal distance was measured as the difference of the number of centuries between the median time periods for the same given pair of sites. Analysis of variance was used to assess the effect of temporal and geographical distance on the variability of biological distance. In this analysis temporal and geographical distances were each classified into three levels, respectively: 6-10 centuries, 11-20 centuries and 21-30 centuries; and 0-40 km, 41-80 km and more than 81 kilometers. In addition, the biological distance matrix was calculated and assessed for significance, with partial correlation of biological distance on temporal distance (controlling for spatial distance) and on spatial distance (controlling for temporal distance).

Results

Table 2 contains the matrix of biological distances between fourteen archeological sites calculated with three first principal components' values (below the diagonal). Because one of the sites (Durres) contained skeletons from three separate time periods, they were treated as three distinct sites with zero geographical (spatial) distance between pairs and temporal distance equal to the difference of median values of their respective time periods. Consequently, the biological, temporal and spatial distance matrices were 14 x 14 matrices. The matrix of biological distances was then used to draw the dendrogram of Figure 2 that shows the relationships obtained between the fourteen populations (that

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represent the fourteen archeological sites). Nearly the same set of relationships were obtained when the above populations were scattered in the space of the first three principal components (Figure 3). The above results suggest the presence of a trend of biological relationships among geographically related populations. In other words, populations with small geographical distances generally tend to also have relatively small biological distances (PI - BU - BY, or D1 - D2 - D3). However, there were also some cases that didn't obey this trend (AP - PR, LU - KO).

Table 3 shows the values of the principal components, the percentage of within-group variation explained and the temporal correlation between median site time and component score. The first three components explained together 75.05% of the variation. On the other side none of the correlations was significant. The same results were obtained when partial correlations between biological distance (calculated from the values of the first three principal components) and temporal distance ($r = -0.007$) were calculated, whereas the partial correlations between biological distance and geographic distance was $r = 0.287$.

Table 4 contains the matrices of temporal distance (above the diagonal) and geographic geographic distance (below the diagonal). It was shown that temporal distances varied between 0 - 31 centuries (BE - LU) and that geographical distances varied from 0 to 129 kilometers (KO - BU).

The analysis of variance gives evidence on the effect of geographical distance on biological distance ($P < 0.01$); this effect was not significant when temporal distance was analyzed.

It is worth emphasizing, in addition, that according to the least squares method, increasing of the temporal associated was accompanied by the increasing of the biological ones in all the corresponding levels.

Discussion

The results presented in this paper suggested that they almost

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agreed with the model proposed by Konigsberg (1990); the correlation between biological distance and geographical distance (controlling for temporal distance) was positive, although with small value (r = 00.287), while there was no correlation (r = -0.007) between biological distance and temporal distance (controlling for geographical distance). The above suggestion was supported also by the fact that three populations of Durres, differing in time, were grouped together (see Figure 3). On the other hand the effect of temporal factor, according to the analysis of variance, was not significative, while the effect of geographical distance on the biological one was found to be significant ($P < 0.01$). According to our results, in contrast with those obtained by Konigsberg (1990), no significant correlations were found between median date of fourteen archeological sites and eight principal components.

All the above results suggested, to some extent, the presence of a homogenization effect in the genic flux. This leads to the following alternatives: the absence of the correlations between median time of fourteen archeological sites and each of eight principal components is either a consequence of the homogenizing effect of the genic flux or a consequence of the common origin of the whole group of populations under the investigation.

We think that both the above alternatives do not contradict each other, because high genic flux is expected in the human populations with a common ethno-cultural constitution. On the other side, there were not found any group formations of the populations according to their latitude (north or south) or/and geographical altitude.

However, the problems discussed in this paper remain debatable because the application of the "isolation by distance" model for populations viewed across space and time encounters difficulties in analysing the variation within and between populations.

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Conceptualization of Aging in a Cross-National Context

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This paper presents a theoretical model of successful aging in a cross-national context. The major thesis is that objective congruence between individuals' age reference set and activity level leads to high meaningful existence. Although adult-age reference set is thought to be associated with lower meaningful existence, those with adult-age reference set and high activity are thought to have high meaningful existence. Included in the paper are rationales of this thesis, specifically addressed to the content of American and Chinese cultures, hypotheses both within and between cultures as implied by the model, and policy implications.

In the social gerontological literature, successful aging has constantly been a major concern. The two dominant polar theories of successful aging are disengagement theory and activity theory. It has been documented that neither of these theories is sufficient to explain successful aging in view of empirical evidence. Many aging programs, however, are geared toward the activity model. The question concerning the relation between activity and the meaningful existence of old people is thus a crucial one considering the policy implications which impose value judgments. Existing theories tend to be culture-bound and have validity problems even for American society (Cowgill, 1972).

This paper is an attempt to conceptualize aging in a cross-national context by integrating both disengagement and activity theories into a more general theoretical framework together with elements of age reference set and membership reference set. The rationale of the model is presented, specifically addressed to the content of American and Chinese cultures. Hypotheses implied by the

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model, both within and between cultures, are also delineated for empirical verification.

Rationale

Victor Frankl stated that human beings seek primarily to find meaning and purpose in their existence (Crumbaugh and Maholick, 1963). According to Frankl (1963), there are three principal ways in which people can find meaning in life: first, by what they give to the world in terms of their creation; second, by what they take from the world in terms of encounters and experiences; and third, by the stand they take when faced with a fate which they cannot change. Meaningful existence is defined by values. On the very general level, it appears that in every known society there are certain dominant values. These dominant cultural values vary from one society to another. According to Margaret Clark (1972), the American core value is freedom. Freedom depends on the value of individualism which, in turn, produces the definition of self-esteem predicated on independence and self-reliance (Clark). Clark (1972) further commented that self-reliance in turn is tied to work and productivity, and the norm of reciprocity is not applicable to services rendered in the remote past. In contrast, Chinese society appears to devaluate individualistic achievement, but emphasizes mutual dependence which submerges individuals into their immediate group. Chinese culture seems to emphasize conservatism, self-acceptance, and cooperation rather than acquisition, exploitation, self-advancement and control. Furthermore, in Chinese culture the norm of reciprocity is applicable to services rendered in the remote past.

On the more specific level, there are separate age-cultural patterns for different periods of the life span within every society. These age-cultural patterns emphasize behaviors and values congruent with the physical conditions of the age category. The major adult-age cultural patterns in both American and Chinese societies appear to include independence, self-reliance, and work. The old-age cultural pattern in American society, however, is characterized by restriction and protection (Cavan et al,, 1949). The specific societal behavioral expectations for old people in both societies consist of retirement

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from full-time paid employment, more rest, less activity, less aggressiveness, and more dependence on others, particularly in Taiwan where compulsory retirement of civil service workers and teachers has been enforced since 1967. Old people are also expected to take less interest in their own careers but more interest in the careers of their children and grandchildren. Essentially, the old-age cultural patten is disengagement oriented and the adult-age cultural pattern is activity oriented, particularly instrumental and active activity oriented. These dominant age-cultural patterns seem to be similar in both Chinese and American societies.

Old people in general appear to be aware of the dominant cultural values and old-age cultural patterns, although some may not orient themselves toward these or may not accept the cultural evaluation of old age. When old people orient and compare themselves with the old-age cultural pattern, the old-age category becomes their membership reference set. When old people orient and compare themselves with the adult-age cultural pattern, the adult-age category becomes their non-membership reference set. In other words, old people may adopt either an old-age reference set (membership reference set) or an adult-age reference set (nonmembership reference set). Norman Kaplan (1955) suggests that one of the major conditions leading to the adoption of a non-membership age reference set is the lack of satisfactory reference groups at the intimate subgroup level. A society such as America, which defines old people as dependent on the one hand, but devaluates dependency on the other hand (due to its dominant value of individualism), tends to accord low social status and negative labels to old people as a group (Clark, 1972). When people move from the middle-age status to the old-age status in the life cycle, many respond to a devaluated status by clinging to youthful norms and middle-age years for guides of behavior (Bengtson, 1973; Rosow, 1973), although these people may have been forced into a behavioral transition from an engaged state to a disengaged state by the restrictive social environment following compulsory retirement and/or by a lack of personal resources. Old people are left largely on their own, without cultural support, to make the transition of behavioral orientation

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from the adult-age reference set to the old-age reference set. Although some old people can transcend the cultural contradictions and act upon the unfavorable definition, many in such a society will continue to use an adult-age reference set.

In contrast, Chinese society tends to define old people as dependent and at the same time views this dependency as a prerogative of old people as reciprocation for services rendered in the remote past. Thus, Chinese society tends to accord a high social status and a positive label to old people as a whole. Chinese society has been described as a "gerontocracy" in which old age is taken as a virtue in itself. Such a society, with the cultural support for old people, facilitates the orientational transition from the adult-age reference set to old-age reference set while old people become more disengaged in old age. Of course there are some cases of old people who reject the favorable cultural definition of old age and continue to cling to the adult-age reference set.

Nevertheless, the values which old people use to define meaningful existence primarily come from their age reference set since individuals operate for the most part in small groups within the society. The dominant cultural values of a society, that is, are viewed as too general in describing a specific person's meaningful existence directly. Instead, the dominant cultural values are filtered through the adoption of a specific age reference set along with other personal factors. In the cases where the values from the individuals' age reference set are incongruent with that of their age membership group and/or the dominant cultural values, the former becomes more salient in defining the individuals' meaningful existence.

Specific values in evaluating self and defining meaningful existence may be functional for one stage of life but dysfunctional for other stages in the life cycle. Biological aging involves a gradual decrease in viability and increase in vulnerability and finally death. This deteriorative process of biological aging is irreversible in spite of cultural and individual variations in retarding this process. Dependency of all kinds apparently occurs in all cultures and it seems to be an almost inevitable companion of advanced age (Clark, 1972). Emphasis on the activity and achievement oriented values of the

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adult-age cultural pattern will lead ultimately to a disparity between societal expectations and the potential abilities of old people to meet these expectations. This incongruence is likely to result in stress and disturb the equilibrium which is already hard to maintain in old age. Subsequently, such stress could lead to premature aging and destruction of the normal aging processes.

There are other considerations besides physical decline in old age underlying the assumption that the values of the adult-age cultural pattern become increasingly dysfunctional for old people in defining meaningful existence. First, in view of the decrements and losses in old age, old people with an adult-age reference set tend to suffer deprivation relative to their own earlier life as well as to that of younger people. This relative deprivation may subsequently lead to discontent, low self-image, and low meaningful existence. Clark and Anderson (1967), in their study of older Americans in San Francisco, found that the value orientation of the maladapted aged were strikingly similar to the adult-age cultural pattern.

On the other hand, old-age identifiers experience congruency between their value orientations and their physical conditions; they also experience little relative deprivation. Since old-age identifiers have a membership reference set, what is expected of them by others of significance is congruent with what they expect of themselves (Secord and Backman, 1961).

In this situation, persons feel most satisfied with themselves and their living conditions (Secord & Backman, 1961). Thus the old-age reference set by itself is thought to be positively related to meaningful existence of old people; whereas the adult-age reference set is negatively related to it.

In addition the effect of the activity level on old people's meaningful existence appears to depend on the type of age reference set adopted. In other words, the activity level has a differential effect on meaningful existence. To the adult-age identifiers, a high activity level contributes positively and a low activity level negatively to their meaningful existence because of congruence between reference set and behavior. Similarly, the reverse is also true for the old-age identifiers because of the lack of congruency.

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The meaning of activity, however, should also be taken into account. Voluntary activity seems to have very different meanings from involuntary activity, and hence, to have different effects of meaningful existence. In the same way, voluntary disengagement has different effects from involuntary disengagement. This contention is partially supported by Lowenthal and Boler's longitudinal study, (1965) which suggests that people who elect to withdraw from social activity are more satisfied with their lives than those whose withdrawal is forced upon them. In this same study, reduction in social activity with aging was found to be more consistently associated with low satisfaction than is reduced activity. Behavior and attitude, however, need not be congruent; i.e., the type of age reference set adopted need not be consistent with the actual activity level. According to Halbgewachs (1965), overt behavior depends on the emergent opportunity and situation for its expression or inhibition; but inward attitude does not depend on these. In other words, overt behavior is a result of both the actor's attitude and the objective situation in which behavior takes place.

The major thesis of the model is that congruence between the individual's age reference set and their activity level leads to high meaningful existence. Stated differently, cognitive dissonance is perceived as having a negative effect on meaningful existence. This conceptualization seems to be implied in Festinger's (1957) theory of cognitive dissonance. In this theory, dissonance is viewed as a negative drive state which occurs whenever an individual simultaneously holds two inconsistent cognitions. Cognitive dissonance is presumed to be unpleasant and individuals strive to reduce it by adding "consonant" cognitions or by changing one or both cognitions to make them more consistent with each other.

Hypotheses

Based on the rationale described above, the following hypotheses are delineated for empirical verification. First are the hypotheses for examination within cultures. These are followed by hypotheses comparative for American and Chinese cultures.

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Culture-specific hypotheses

H1: Old-age identifiers tend to have higher meaningful existence than adult-age identifiers.

H2: Old-age identifiers with a low activity level tend to have higher meaningful existence than old-age identifiers with a high activity level.

H3: Old-age identifiers with a low activity level tend to have higher meaningful existence than adult-age identifiers with a low activity level.

H4: Old-age identifiers with a low activity level tend to have higher meaningful existence than adult-age identifiers with a high activity level.

H5: Old-age identifiers with a high activity level tend to have higher meaningful existence than adult-age identifiers with a low activity level.

H6: Adult-age identifiers with a high activity level tend to have higher meaningful existence than old-age identifiers with a high activity level.

H7: Adult-age identifiers with a high activity level tend to have higher meaningful existence than adult-age identifiers with a low activity level.

H8: The activity level has differential effects on meaningful existence depending upon the age reference set adopted. With an adult-age reference set, a high activity level is positively and a low activity level is negatively related to meaningful existence. With an old-age reference set, the opposite is hypothesized.

Comparative Hypotheses

H9: As compared with American retirees, Chinese retirees tend to have a more favorable attitude toward old people in general.

H1O: American retirees tend to assume the adult-age reference set; whereas, Chinese retirees tend to assume the old-age reference set.

H11: As compared with Chinese retirees, American retirees tend to have higher activity level.

H12: Among those whose age reference set is incongruent with

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their activity level, American retirees tend to be reluctant disengagers; whereas, Chinese retirees tend to be reluctant engagers.

H13: Chinese retirees tend to have higher meaningful existence than American retirees.

H14: As compared with the Chinese retirees, the dominant type of aging among American retirees tends to be the adult-age reference set with a high activity level. And the dominant type of aging among the Chinese retirees tends to be the old-age reference set with a low activity.

Discussion

This model appears to offer several advantages. First, it may be more general and less culture-bound than disengagement and activity theories as well as other existing theories in the sense that its use may not be limited to any single society. Further, it does not imply a uniform value judgment on the meaningfulness of activity. Reluctant engagement may be perceived as being as undesirable as reluctant disengagement in relation to meaningful existence. With an addition of some cultural variables, such as dominant cultural values with regard to activity and cultural meaning of old-age, the model can further predict the dominant aging patterns and typical pattern of incongruence between activity level and age reference set among old people in a given society; and thus it can offer some predictions pertaining to cross-national comparisons.

In addition, this model implies more than one intervention strategy. The effort to enhance meaningful existence of old people can be directed toward the change of either individuals' age reference set or their activity level so as to bridge the disjunction between these two. On the group level, a more permissive social and cultural environment may be called for to aid in fostering greater diversity in life styles. It may not be desirable to force old people into one single mode of adaptation. If the model is found to be valid, aging programs which are primarily geared toward the activity model might need to be reconceptualized. On the general cultural level, liberation of the elderly population from adopting the activity and achievement oriented adult-age cultural pattern as their age reference set may be

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productive in view of the inevitable physical decline in old-age. Otherwise, the potential gain in freedom in old age may well become a burden rather than a blessing. Empirical verification of the hypotheses, of course, must precede any really serious discussion of policy.

Appendix A: Nominal Definition of Concepts

Values - the criteria or conceptions used in evaluating things (including objects, ideas, acts, feelings and events) as to their relative desirability or merit (Zanden, 1970).

Old People - those who have been retired from their major work role.

Old-age Cultural Pattern - societal behavioral expectations on and demands of old people as an age group within a society (cavan, et al., 1949).

Adult-age Cultural Pattern - societal behavioral expectations on and demands of adults as an age group.

Age Reference Set - a category of age group whose cultural pattern serves as comparative and normative functions for an individual. "Old-age reference set" refers to the category of old people whose cultural pattern serves as comparative and normative functions for an individual. "Adult-age reference set" refers to the category of adult people whose cultural pattern has been adopted by the individual.

Old-age Identifier - an individual with an old-age reference set.

Adult-age Identifier - an individual with an adult-age reference set.

Membership Reference Set - the reference set in which a person has a membership. In this study, it refers to the old-age category as an age reference set. (Hyman, 1942).

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Nonmembership Reference Set - The reference set in which a person does not have a membership. In this study, it refers to the adult-age category as an age reference set.

Activity Level - amount of time spent in any regularized or patterned activity.

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The Geography of American Achievement

Nathaniel Weyl

CONTENTS INCLUDE

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Concealed Ovulation as a Strategy for Increasing Per Capita Paternal Investment

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A new theory is advanced to explain the disappearance of estrus in human females, which argues that longer estrus, by making females harder to control, made them less suitable for inclusion in large "partner sets". This made them less attractive to dominant males and caused them to be in smaller partner sets. Longer estrus was selected for until females were continually in estrus. Males were then no longer selected to respond to the sign of estrus and estrus then disappeared. This theory is compared with other theories in the literature and menstrual synchrony is also explained.

This paper will develop a theory of the concealment of ovulation in humans that represents a synthesis of several strands in the literature. In the tradition of Alexander and Noonan (1979), emphasis is placed on paternal investment, although here it is the cause rather than the effect of concealment of ovulation. From Strassman (1980) comes the idea that altering estrus might make females less attractive to dominant males. Following Symons (1979, pp. 138-139) and Fisher (1982, pp. 87-103), this change will be argued to be caused by females extending estrus in order to be better able to exchange sex for food. This will be combined with the emphasis of Hill (1982) and Tooby and DeVore (1987) on the idea of male-gathered meat as the food item initially shared.

Of course, others have reviewed the problem of why humans came to have concealed estrus (Hrdy 1988, Diamond 1993), and Steklis and Whiteman (1989) have questioned whether it has been clearly demonstrated that female hormonal status fails to affect

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human sexual behavior. Rather than write yet another literature review, a comparison of the theory put forward with that of other authors will be made after the new theory has been expounded. It will then be easier to see the similarities and differences with other theories.

There is the question of whether the ancestors of humans ever exhibited signs of ovulation. Sillen-Tulberg and Moller (1993, Fig. 2) present a phylogeny of the primates in which parsimony is used to argue that the ancestors of humans exhibited slight signs of ovulation, with humans evolving to have no ovulation signs, and chimpanzees to display sexual swellings.

Before discussing humans, it may be useful to say something about other species. Typically, in most animals the female gives clear signs by odor or otherwise of when she is ovulating and can become pregnant (revealed ovulation), and males focus their copulations on that period.

In most birds, ovulation is concealed (Ridley, 1993, p. 231). Interestingly, in most birds, like humans, but unlike most mammals, the male assists in providing food to the young. This is probably related to the fact that birds are typically born unable to fly and unable to provision themselves, while being warm blooded, they require considerable food. While 90% of birds are monogamous (Kleiman, 1977), less than 3% of mammals are.

Canids are closer to humans (Moehlman, 1989). These are among the few mammals in which males help feed the young. Not surprisingly, they are typically monogamous. Like humans, they live in groups (called packs). However, they avoid the conflict between the females benefitting from monogamy and the dominant males benefitting from easy recognition of, and access to ovulating females, that is the subject of this paper. This is done by only one female in a pack reproducing at any one time. The mechanism seems to be that the dominant female prevents other females from breeding, and/ or successfully raising their offspring.

A typical and well studied canid is the wolf, which like other canids and humans lives in groups, mates monogamously, and has males which feed the young. "Generally, only one female has cubs, whether in a big pack or a small one" (Zimen, 1981, p. 238). Thus, there is no competition among females for male provisioning. All the

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animals in the pack help with feeding the young. Thus, while in many ways wolves resemble humans, the solution for the problem of group living while raising young is different.

Of course, the mammals that are closest to humans are primates. However, in none of the primates do the males make an appreciable contribution to provisioning the females or their offspring, although chimpanzee males do give some of the meat they obtain to the females. For instance, in the orangutan, the females and males live separately (probably because the fruit they live on is so dispersed that even a pair traveling together is at a feeding disadvantage), and males do not provision the females (Maple, 1980). Thus, they do not experience the problems that are the subject of this paper.

Humans appear relatively unusual in that they live in groups, make paternal investments (which requires a high degree of paternity certainty), and yet have a mating system in which the timing of female ovulation is hidden, with the result that humans engage in relatively large amounts of sex at times of the month when females are infertile. That the latter is rare is implied by Kleiman's (1977) conclusion that with most mammal monogamy the adult male and female exhibit infrequent socio-sexual interaction, except during the formation of the pair bond. While humans are not completely monogamous, monogamy is common enough so that the frequency of their sexual interaction needs explaining. The proximate explanation is that since males and females do not always know when the female is ovulating, frequent sex is needed to insure impregnation. However, this raises the question of why ovulation is concealed in humans, and how did this concealment evolve. The author has proposed elsewhere a purpose for human's frequent sex (Miller, 1996).

Emergence of Concealed Ovulation along with Male Provisioning

The account here will start with primitive hominids living in multi-male groups similar in social organization to today's chimpanzees and bonobos, man's closest relatives. The major difference is that with the emergence of hunting, males begin to provision females on a regular basis. According to Lovejoy (1981, 1993), this was probably in the Miocene. His argument is that the most plausible advantage to an upright posture is that it frees the

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hands for carrying food to one's mate. The importance of the male provided food was probably essential nutrients rather than merely calories. This led to bonding between males and females, with the males provisioning females they regularly copulated with. These females' offspring were likely to be his, and the male provisioning contributed to their support, as well as encouraging female cooperation in mating.

In multi-male bands, males differ in fighting ability and in dominance. A viable reproductive strategy for some males is to try to keep certain females for themselves by preventing other males from mating with these females. A dominant male can generally prevent another male, ranking lower in the hierarchy, from mating with a female he desires, although the problem of watching more than one female at the same time may limit the number he can control, and his mating success (see de Waal 1982 for evidence on dominant male chimpanzee mating success).

Thus, each female can be thought of as being mated with a particular male, who gets most of her copulations, and who provides at least some food and protection. The number of females who are mated with each male will vary. These females will be referred to as the male's "partner set." While the word "harem" might be used, it calls other associations to mind (Rowell, 1991), and will be avoided here.

Which females are in a dominant male's partner set will depend primarily on his choice. This assumption may somewhat overstate the male role, but it provides a useful expository device for illustrating certain effects. (Models emphasizing female choice can be constructed that illustrate similar effects.[2]) These dominant males will include in their partner sets the females their evolved mechanisms cause them to be most attracted to (with what attracts being essentially signs of ovulatory state). Other males settle for the

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[2] In these models females experience unwanted pressure from copulations from dominant (and non-dominant males) that adversely affect their reproductive success, notably through what is now call rape, by causing their chosen mate to doubt their loyalty (especially where the other males succeed by rape). Models of this type resemble those of Knight (1991). Once the harem models are understood, these alternative can be understood.

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remaining females.

There are several effects on female reproductive success of being in a particular partner set. One effect is through the quality of the male, and the genes he contributes. The other effects pertain to paternal investment. The primary effect is that the larger the partner set, the more females there are to divide the male's investment among. Thus, females in a large partner set receive less provisioning per capita than females in small partner sets. In addition, guarding a large partner set may require more male time, reducing the time available for foraging. This effect reduces the total male parental investment.

The combined effect of these factors will normally be that in large partner sets, females and their offspring have less food. This reduces the number of offspring females raise to adulthood. All other things equal, this means that the genes of females suitable for inclusion in large partner sets will be selected against.

However, other factors are not equal. The dominant males who can assemble large partner sets have better genes. In particular, they are likely to be more disease and parasite resistant. Also, some genotypes may be more fitted for certain environments than for others, and the male with the best suited genotype is more likely to be dominant. Of course, factors like luck, age, and alliances enter into dominance, so dominant males do not always have the best genes, but dominance is probably one of the best clues available to a female.

After the offspring are grown, the only effect of which partner set their mothers were in is through the genes. Thus, we can describe the quality of the male genes as determining the number of great-great-great-grandchildren each leaves (the number of greats is conceptually quite large). Also, the genetic quality of the father probably has some effect on the survival of the offspring in the first generation, as well as on their later ability to become dominant, to produce offspring, and on the ability of these offspring to survive and produce more offspring.

The total number of descendants left in the current generation by the females will be a function of two factors, the number of offspring surviving to adulthood, and a measure of the father's genetic quality. The latter is basically determined by the number of

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descendants each child leaves in future generations.[3] The first number can be presumed to be increasing with partner set size, and the second to be decreasing.

The Basic Model

The basic model is related to the polygyny threshold hypothesis that has been applied to other animals. If the resources controlled by the male are sufficiently rich, it may be in the female's interests to share a male. Otherwise the female's interests are promoted by not sharing a male.

For illustrative purposes, imagine just two partner set sizes. Imagine that dominant males in the group can each successfully monitor and control three females. Only one of these is likely to be in estrus at any one time (at least at the start of the evolutionary process being described). The dominant male can keep other males away by watching her and threatening any that get near her (supplemented by punishing her if she cooperates with any other males). Two females in estrus at the same time would be difficult to protect from other males, especially if one female had a tendency to wander off when in estrus (and, as will be argued, such a tendency is likely to have evolved). Thus, the dominant male will not be able to sequester all of the band's females in his partner set, but will leave some for other band members. An additional incentive to provide some mating opportunities for other males in the band is that this may be necessary to keep them from leaving the band, and to maintain an optimal size hunting group.

After the dominant males have picked what they each regard as the three most attractive females for their partner sets, the less attractive females are left for the other males. Let's imagine that these are held in one-female partner sets by the non-dominant males.

To make the argument more concrete, imagine a female can raise S_1 offspring to adulthood in a one female partner set

[3] This is excluding from the discussion any effect of the father on his adult offspring's reproductive success, except through the genes he leaves them. It is possible that there are other effects, such as the children inheriting his status, or benefitting from coalitions with him. Such effects are possible, and probable in current human societies. However, since they contribute nothing to the discussion, they will be ignored here.

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(monogamous union). The letter S stands for support, and is meant to suggest the effect of per capita male investment on the support the offspring receive. Also, suppose each child leaves G_1 descendants. The letter G stands for genes and is meant to suggest the effect of the father's genes on the success of his offspring. In a three female partner set, the numbers are S_3 and G_3. The total number of descendants for the two cases will be S_1G_1 if in a one female partner set, and S_3G_3 if in a three female partner set. In the argument below the generation length will be presumed constant.[4]

Male Strategy

The total number of descendants left by the male with three female partners is S_3G_3 for each of his females, or a total of $3S_3G_3$. The number of descendants left by a male with one partner is $1S_1G_1$. In normal circumstances, such as early humans evolved in, this number will be less than $3S_3G_3$. Thus, males with multiple partners leave more descendants because they have more females giving birth to their offspring. In these circumstances, males will have evolved a desire for multiple partners. This will normally imply selection for the dominance and fighting ability observed in most primate males.

What type of females will such a dominant male be attracted to? He will be attracted to short estrus females. The reason is that he can protect these females from other males by defending them during estrus. The shorter their estrus, the shorter the period in which he must defend them. In particular, a short estrus reduces the probability of two females being in estrus at the same time, which would make it very hard to defend both. In addition, fewer copulations and less sperm are required to impregnate a female with a short estrus. The size of the partner set a dominant male can hold rises, and the probability of female cheating falls, if he picks short estrus females. Thus, males can be expected to be attracted to short estrus females.

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[4] If there is an effect of harem size on generation length, it probably takes the form of children in small harems reaching sexual maturity sooner because of having been better provisioned. The argument would be strengthened, but made more complex, if this complication was allowed for.

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Selection Among Females

What type of selection will affect the females? If, as appears to be the case for non-human multi-male group living primates, paternal food gathering is unimportant, S_3G_3 will exceed S_1G_1. Estrus is then easily explained. It is in the reproductive interest of the female to have her offspring fathered by a dominant male (with his superior genes), and she has evolved to attract such males. Estrus, combined with such forms of advertisement as genital swellings, makes it easy for a dominant male to keep other males away during her fertile period. It has thus been selected for.

A more interesting case is when S_1G_1 exceeds S_3G_3. In this case, the females who are in monogamous unions leave more descendants than those who are one of several females whose reproductive powers are monopolized by a single dominant male. They will then be selected to avoid attracting the attentions of dominant males. In these circumstances, whether a female is monopolized by a dominant male depends on her attractiveness to the male, thus females will be selected for *unattractiveness*. Notice the contrast with the usual prediction of sexual selection theory, that females will be selected for attractiveness (Symons 1979, pp. 185-204).

There is a sexual conflict of interest, with a female's reproductive interest being to be outside of a dominant male's partner set, but the dominant male's reproductive interest being to keep her in his partner set. Consider the case in which all males are equal in genetic value, but each female can raise .9 offspring of each sex to maturity in a dominant male's partner set, and 1.2 in a monogamous relationship. Such a difference would probably not arise from a difference in impregnation rates, but could easily reflect a difference in survival rates. With the food collected by the dominant male divided three ways, the dominant male's offspring would be less well fed than the offspring of the non-dominant male, who had the undivided benefit of a male's food gathering.

In these circumstances, females would be selected for resistance to inclusion in dominant males' partner sets. However, since a male that heads a partner set leaves his genes in the offspring of three females, he would leave 2.7 offspring of each sex, versus the 1.2 for the non-dominant males. The males would continue to be selected for dominance and for partner set holding. Again notice the conflict of

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interest between the sexes.

Selection for Female Unattractiveness

How would females evolve to avoid being monopolized by dominant males? The obvious solution is to become less attractive to dominant males.[5] Sexual attractiveness reduces fitness rather than increasing it. This is a somewhat surprising conclusion, since in most of the literature maximum attractiveness is usually considered to be selected for.

During food shortages, when monopolization by a dominant male was very undesirable, females might have been selected for all sorts of unattractiveness. Even ill health could be temporarily selected for (assuming males had evolved to find any sign of ill health unattractive). However, in the long run such ways of avoiding male attention would be dominated by other methods. Thus, any adaptations that lowered health or fitness would be selected against in favor of ways of being unattractive that did not reduce their survival.

Female unattractiveness, unless correlated with something that makes their fertility unusually hard to monopolize by other than provisioning, is likely to disappear as males in turn adapt to prefer the characteristic previously considered unattractive. If females with large noses were considered unattractive and hence left more descendants, females would be selected for large noses. However, soon large noses would be an asset in females, and a male preference for large noses would be selected for. Thus, the effect would disappear. Any signal that kept females from being monopolized, but that did not discourage male attempts to monopolize more than one female, would not continue to be considered undesirable.

An interesting speculation is that large breasts may have once acted the way of large noses in the above example. In chimpanzees, females with large breasts are those lactating. These cannot be made pregnant. Males should have once been selected to find such females unattractive. Only non-dominant males would have bothered to

[5] Obviously, the female will not be selected to be so unattractive that no male will mate with her, but given the low cost of copulations to males, this is not a significant worry.

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attempt mating with such females (which might occasionally have resulted in pregnancies). Females would have then been selected for large breasts, and sexual selection might have fixed the trait. This idea is developed further in Miller (1995b).

Male response to duration of estrus can persist because it indicates a female whose fertile periods will be expensive to monopolize. This is because she will require more inseminations and will have to be defended longer, thus requiring male resources that could more efficiently be used to mate and defend other females with shorter fertile periods.

Conditions in which Selection is for Short or Long Estrus

What determines whether concealed ovulation is selected for? If S_3G_3 exceeds S_1G_1, the females leave more descendants if they are monopolized by dominant males. If S_3G_3 is less than S_1G_1, selection is for traits that make monopolization of her fertile periods more difficult.

It was argued that the dominant male generally provides the best genes, while the non-dominant males provide the females with the most food per capita. It is perhaps more useful to restate the conditions in terms of ratios of offspring surviving to adulthood to the ratios of genetic benefits. If S_1/S_3 exceeds G_3/G_1, the environmental benefits of being well provisioned (which implies monogamy) exceed the genetic benefits of being fathered by a dominant male, and selection is for female unattractiveness and long estrus.

Genetic Considerations

Genetic benefits of being fathered by a dominant male exist, but are likely to be small. That natural selection will normally cause the alleles in any population to be those which most contribute to fitness is predicted by theory (Falconer, 1989). It has been found empirically that in non-human species that the traits that appear closest related to fitness tend to have lower heritabilities (Gustafsson, 1986; Mousseau & Roff, 1987; Roff & Mousseau, 1987). If such fixation has already occurred, there will be no permanent genetic advantage for one male over another, and G_3/G_1 will approach unity. Which males become dominant will be determined by luck and environmental advantages. This is likely to have happened when the

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environment has been stable for a long time (many generations) and any genes that do not contribute to fitness in that environment have already been eliminated.

If the environment has changed recently, there may be some genes still in the gene pool that contribute to fitness, perhaps through making the animal healthier, etc. The dominant male is a little more likely to have these genes than the non-dominant male, causing G_3/G_1 to be positive.

There are a couple of aspects of the environment for which there is a high probability that some genes will be better than others. These are the parts of the environment that result from other living organisms that are evolving to take advantage of the host organism. The classic examples are predators, parasites, and disease organisms. These are constantly evolving to take advantage of the host, and the host is constantly evolving to defend itself. Because diseases and parasites have evolved to find a weakness in the host, there is a good chance that some individuals have acquired genetic immunity but others have not (Tooby 1982, Tooby and Cosmides 1990, pp. 31-33). The males with the genetic immunity are more likely to have become dominant, and thus to have better genes. Less often, resistance to predators or to individuals of the same species will be greater in some genotypes than in others.

Thus, there is a presumption that G_3/G_1 will be positive, although probably not much above unity. The positive nature of G_3/G_1 implies evolution towards a few males doing most mating and towards short estrus if S_1/S_3 is unity or less.

When might S_1/S_3 be only unity?

Whenever paternal investment is zero, there is no difference between the paternal investment provided to offspring in large partner sets and those in small partner sets or outside of partner sets. Where both S_1 and S_3 are zero, the ratio is 1. This is by a mathematical convention (zero divided by zero is unity), but this convention makes sense here. In the numerous cases where males provide no paternal investment, including the important case where they provide no food to females or infants, the prediction is that females will be selected to attract dominant males through short

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estrus.[6] When $S_1=S_3$ etc. the males are making equal investment in the offspring of all females. This happens when a male invests by successfully protecting them against other males or by protecting the troop as a whole.

In most primates living in multi-male groups, the females provide the vast bulk of their own food.[7] While there is male protection from predators and conspecifics, this is usually provided by males to the group as a whole, and hence probably only limited differences between partner set sizes will be found. If there is a difference in protection, it may take the form of the mates of the dominants being better protected from other males. Thus, the prediction is that in the typical primate living in multi-male groups, females will have evolved to advertise their fertility. This is what has been found.

Female Selection with Hunting Males

Now consider the opposite extreme. Hunting has emerged and has permitted the movement of early man into colder climates. Big game hunting is done only by males for obvious reasons.[8] Imagine a snowy winter when the only food came from male hunting of large game. The female in a three female partner set would receive 1/3 of her mate's surplus, while the female in a single female partner set would receive all of her mate's surplus. There is a three fold difference in the female's food supply. It is easy to see how females in a large partner set would leave fewer descendants, and females would be selected to be unattractive to the dominant males. This would call for concealed ovulation.

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[6] There are a few other ways in which females may be selected to have their offspring fathered by the genetically superior dominant males. If the females make loud noises during copulation, this will attract the dominant males' attention, who will stop the mating if it is by a male they can dominate. Thus, females are selected for copulation noises.

[7] A small amount of male provisioning, especially by meat sharing, is observed in other species such as chimpanzees (Goodall pp. 299-301) and bonobos.

[8] For a documentation of this fact and a discussion of some of its other implications, see Miller, 1994, 1995.

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Less extreme cases are certainly possible. Suppose the available food is such that both males and females can collect it (as with most plant foods), and males have evolved to share with their mates. To a first approximation, males and females should be able to collect approximately equal amounts of food, and would generate approximately equal surpluses after meeting their own needs. In this case, the female in a three-female partner set would have 1 1/3 adult surpluses to support her offspring, while the monogamous females would have 2 adult's surpluses for her offspring.

In a food scarce environment, one would expect appreciably better survival for the non-partner-set offspring. In either of the above circumstances, S_1/S_3 would be expected to be positive, and large enough to exceed G_1/S_3. Females would be selected to be hard to monopolize and to be undesirable for partner sets, and long estrus would be selected for. Thus, male provisioning would select for long estrus.

The Disappearance of Estrus

Once longer estrus had been selected for, and was possessed by most females, there would be selection for even longer estrus, since it would always be the females with the longest estrus which would be left for the provisioning, but non-dominant males. The process would stop only when females were continually in estrus.

Of course, once all females were in estrus, males would no longer be selected to find estrus attractive. Once males no longer respond to estrus, the females might be selected for non-estrus. Such selection for non-estrus is especially likely if estrus involves disadvantages, such as a brightly colored patch that attracts predators. Goodall (1985, p. 482-483) has described disadvantages to the chimpanzee's sexual swelling. For instance, it is more vulnerable to injury and is often ripped open. It appears to cause some discomfort. Thus, if males ever stopped responding, females would then be selected not to display the swelling.

The above argument suggests two conditions necessary for the disappearance of estrus. These are (1) when males have evolved for making paternal investments which benefit only certain females or their offspring, and (2) an environment where such investment results in appreciably more surviving offspring. The most likely circumstances

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are (1) males provide meat, and (2) such meat increases either access to females or offspring survival. These circumstances lead to concealed ovulation. Given that G_3/G_1 (the genetic element) is likely to be only slightly greater than one, it is very easy to imagine that S_1/S_3 would exceed G_3/G_1, implying selection for concealed ovulation. All that is required is for males to make an appreciable contribution to the survival of offspring through provisioning.

The above argument was presented for inclusion in a partner set (considered to have three females), and for non-inclusion, but the argument obviously applies to partner sets of different sizes. If n is the number of females in the partner set, S_nG_n indicates the number of descendants left by females in partner sets of different sizes. In some circumstances, the process may go to one limit or another. Females may be most successful if they are either mated by the dominant male, or if they are mated by a single male who only invests in only them and their offspring. However, there may be circumstances in which the optimal partner set size for females is greater than one, but still less than the number of females in the group.

Alternative Starting Points

The account here started with primitive hominids living in multi-male groups similar in social organization to the chimpanzee and bonobos of today, man's closest living relatives. This differs somewhat from the parsimony argument of Sillen-Tulberg and Moller (1993, Fig. 3) that a uni-male pattern might have been the pattern of the human ancestors. Their argument is essentially that since Pongo, Gorilla, and Homo all exhibited uni-male mating patterns, it is more parsimonious to imagine that Pan (chimpanzees) deviated from a unit-male ancestral pattern, than to argue that a multi-male pattern emerged from a uni-male ancestral stock earlier, and then Homo reverted to a uni-male pattern.

Fortunately, it is easy to start the argument from a uni-male pattern. Imagine that males held partner sets, and unmated males were not included in the group. One strategy for them is to attempt to displace a dominant male from his partner set. Another is to sneak copulations with the females in a partner set when the opportunity presents itself. In trying to sneak copulations, it helps to have female

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cooperation. One way to get female cooperation is to exchange provisioning for it. If meat is regularly obtained by males, by bringing a carcass or part of one, males can give the female an incentive to cooperate. The females who most benefit from such male efforts to sneak copulations would be those the dominant male viewed as least attractive. Prolonging estrus would lower the dominant male's incentive to keep such females from other males, and facilitate their exchange of sexual access for food.

Thus, it is not really critical to the argument whether the ancestral state has a multi-male group like chimpanzees, or uni-male groups like gorillas. In either case, males without partners use provisioning as an aid to obtaining copulations, and it is in the female interest not to be closely guarded by a dominant male. Prolonging estrus reduces the dominant male's incentive to closely watch her.

Likewise, it is not critical that the male provisioning be meat from hunting. It could be gathered foods. As long as male provisioning occurs, females will be selected to encourage it, and to avoid having their provisioner chased away by the proximity of more dominant males. Meat is used because it comes in discrete chunks that are easily transported, and which probably provides very valuable nutrients. Prior to the development of carrying devices (such as baskets), males could not carry enough berries or leaves to make a difference to female nutrition. They can carry a piece of meat.

Another possibility is that human ancestors lacked signs of estrus. The above theory can explain why it did not emerge in humans, but did in other primates. If females displayed obvious signs of estrus, males would soon evolve to recognize these and regard such females as very sexually attractive, since the probability of fathering offspring would be high from copulating with such females. The most dominant males would be the ones who succeeded in copulating with such females. However, since these males could copulate with whom they chose without provisioning, they would be less likely to provision. If they did provision, their efforts would be divided among several females.

The less dominant males would soon learn that provisioning females whose estrus was revealed was less rewarding, since just when they were most attractive, a dominant male chased them away (and perhaps even took their meat). Males who did not learn this would

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experience less reproductive success, and males would soon evolve the rule of not wasting provisioning efforts on such females. Since females who displayed estrus would not be as well provisioned, they would leave fewer descendants, and selection would be against displaying estrus.

Thus, although the story was initially introduced with males holding distinct partner sets, it does not depend on this. Even with a promiscuous mating system, females who attract too much attention from the dominant male or males will be at a reproductive disadvantage, and they will be selected for non-revealed estrus.

In the above account, the reason why estrus was not displayed in current humans is that they are a species with male provisioning. Without provisioning, they might very well display estrus. There are several possible mechanisms to produce estrus. Hrdy's (1988) theory that mating with multiple males is in the female interest is plausible. Advertising estrus causes the male to expend the effort of finding her, permitting the accomplishment of the goal with minimal effort. Alternatively, advertising estrus can cause males to fight over her, and insure that she was mated by the most dominant, who is probably the one with the best genes. In other primates (all of which lack significant male provisioning), estrus has emerged.

This account has been expressed in terms of how estrus was lost, since that is the traditional question, and perhaps the hardest to answer. However, regardless of where the account is begun, there are good reasons for expecting female primates in a species with male provisioning to lack estrus.

Synchronous Ovulation and Other Aspects of Female Unattractiveness

This paper has focused on concealed ovulation, since the absence of ovulation in humans has been widely discussed. However, the argument extends to other aspects of female behavior that make them more or less attractive to males. Physical appearance has already been discussed.

Synchronous ovulation is another mechanism that might emerge. As pointed out, a dominant male has difficulty monopolizing and protecting two females when both are in estrus. Being in estrus at the same time as females already in the male's partner set makes it more

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likely that a particular female will be "captured" by another male, or not added to the partner set. Once most females in a band have coordinated cycles, any remaining females will appear especially vulnerable to the dominant males, since they will be attractive when he is not distracted. The dominant males are likely to insist on consorting with the only female in estrus, preventing her from consorting with males lower in the dominance hierarchy, who would better provision her. Thus, genes for synchronous estrus are selected for.

Turke (1988) has provided a similar theory as to why synchronous ovulation is beneficial in females in bands, although his theory does not deal specifically with the advantages to a female of avoiding inclusion in a partner set. Knight (1991) extended it to avoiding inclusion in partner sets.

One mechanism that could be expected to emerge to make females unattractive for partner sets is sexual jealousy. A female would be expected to evolve to dislike males that had other mates or who provisioned other females, and possibly to attack the other females. It might be thought that, given the earlier assumption of the males being stronger, such female evolution would have no impact. However, it is plausible that males would be less likely to try to monopolize females who tended to wander or who resisted. A rational male response to female reluctance (which they have probably evolved to show) is to let a female who resists go, and replace her with another.

For rape to be a meaningful concept, it is necessary for females to resist. Where males make little paternal investments, females are likely to find it in their interests to mate occasionally with all males in the band, since this confuses paternity, and minimizes the risk that any of them would harm her infant (Hrdy 1981). However, once there is paternal investment and females are rewarding males who provision them, it is no longer in the female's interests to copulate with all males, and female resistance appears. The strongest males, who can chase away other males, may still find forced copulation a viable reproductive strategy and continue to employ it. At this point, rape has evolved. (See Thornhill and Thornhill, 1992, for the possible evolutionary basis for rape.)

However, a female doesn't have to be strong enough to defeat

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a rape attempt to avoid being included in a partner set. All she has to do is to resist enough so that the male finds it easier to choose another female. For instance, all a female has to do is to go off for a few days with a preferred male when in estrus. Once most females have evolved such behavior patterns, partner set holding, dominance seeking, and high mate seeking effort can be a less effective reproductive strategy than making paternal investments through provisioning a single female (more than one for a male with exceptional access to resources).

Immerman (1992) has pointed out another advantage to unattractiveness. Sexually transmitted diseases reduce fitness, partially by causing death, and partially by causing sterility. The more sexually active males are very likely to acquire these. The advantages of having a large number of sexual partners are so great for males as to almost certainly outweigh the disadvantages of greater exposure to diseases. However, this is not true for females. These can bear only a few offspring in their lifetimes, and do not need multiple partners to obtain adequate sperm. The dominant males, with their ability to mate with many females, are more likely to be carriers of sexually transmitted diseases than the less dominant males. This provides an additional reason for females to have evolved to avoid being attractive to the dominant males. A female displaying signs of estrus will attract attention from dominant males. His reproductive payoff from mating with a female in estrus is high enough so he will be willing to fight for the privilege, even if he must overcome the resistance of the female and her mate. Females that attract such matings have their fitness reduced by increased incidence of sexually transmitted diseases (as well as by reducing paternity certainty for their mates). This should strongly select against estrus. If a female who conceals her time of ovulation is unlikely to be fertile at any random time, the reproductive benefits of male aggression are much less likely to outweigh the costs arising from resistance by the female and her mate.

Environments that Select for Long Estrus

It was argued that once male hunting was established, with its provision of easily carried food, that males would evolve to provision females, and that this would lead to the elimination of estrus. For

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selection to act this way, it is necessary for the male provisioning to affect reproductive success. This is very plausible given the likely shortage of food in primitive conditions.

However, it is possible to imagine an environment where it was so easy for a female to gather food that she could adequately feed all her offspring without male help. In such environments male provisioning provides her no reproductive advantage, even if the males have evolved to provision. In such idyllic circumstances, short estrus would be selected for since that maximizes the probability of impregnation by a dominant male's superior genes. If such an environment exists, it is presumably tropical with lots of berries, fruit, and other food easily accessible to females.

Presumably, some environments are sufficiently hostile that a female requires male assistance to raise any offspring. These are the environments that lead to what has been called environmental monogamy (Alexander, Hoogland, Howard, Noonan, and Sherman, 1979). For instance, in northern climates survival through the winter (when fruits disappear, and small game migrates or hibernates) probably required big game hunting (at least before food storage), which is a male activity. Such northern environments may not have been invaded by humans before the appearance of extensive big game hunting. Once such environments were successfully entered, evolution would move towards paternal investment, permanent estrus, near monogamy (i. e. except for exceptionally productive hunters), and concealment of ovulation (if it had not already become concealed).

While it is possible to imagine an environment with such abundant food that females do not benefit from male provisioning, such a food-abundant scenario has one problem. This is the Malthusian tendency for a population to increase until limits are reached. As the population increases, per capita food resources become scarcer. Eventually, they become scarce enough so a female has trouble feeding her offspring from her efforts alone. Male assistance becomes essential.

Females that are part of large partner sets receive only a little male provided food, and selection for females that are unattractive to dominant males occurs. Partner set sizes shrink. As long as there is any size of partner set for which females more than reproduce themselves, the population increases. This intensifies the food

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shortage, and raises the minimum male investment required to raise an offspring. Smaller partner sets are again selected for, and unattractive long estrus females are selected for. The final outcome is close to one male supporting one female (with probably a few unusually good providers having more than one female).

Thus, once male food provisioning has evolved, Malthusian pressures can be expected to make food so scarce so as to force the system towards concealed estrus. Thus, the hypothetical case of males providing food, but food being so abundant that females are not selected for long estrus, is unlikely to persist once male provisioning develops.[9]

Comparison with Strassman

At this point it is useful to go back and compare the theory here presented with other theories, notably those of Strassman (1980) and Symons (1979).

The theory presented here is closest to that of Strassman, and was inspired by her. In particular, the idea that selection was for appeal to low ranking males comes from her. Yet, it differs in several ways. Her theory, like that of Alexander and Noonan, holds that concealing ovulation affects the male investment *made*, while the theory proposed here focuses on the effect on the per female investment *received*.

Strassman seems to contemplate the signs of estrus gradually becoming weaker. This has the problem that males would evolve to still find such females attractive, and such females need not be more attractive to non-dominant than to dominant males. If females with weak estrus are actually more attractive and leave more offspring,

[9] It must be admitted that even with male provisioning of females, males that devoted their efforts to competing for mates rather than provisioning them could conceivably be more successful. Even with females evolving to avoid being mated by males unlikely to provision them (as would happen in these circumstances), it is possible that males would be selected to devote their efforts to dominance struggles rather than female provisioning. Only in this situation would Malthusian pressure not force the system towards such a scarcity of resources that extensive male provisioning was required. However, such selection seems rather unlikely. The observation that human females did evolve concealed ovulation in all climates suggests that the abundant food scenario did not persist over large areas.

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dominant males would be selected to prefer such females, reversing the process.

Strassman (1980, p. 32) argues that males would have evolved to recognize such sham estrus. She is correct that males would probably evolve to recognize (i.e., regard as less desirable) females with long estrus. This is precisely the point. A dominant male who recognized a female with sham estrus would find such a female less desirable. He would maximize fitness by devoting efforts to mating with other females. She would be free to become attached to a male who would dedicate more of his food gathering efforts to her. Thus, lengthening estrus appears a preferable strategy in the postulated environment.

The Symons Meat for Sexual Access Hypothesis

Symons (pp. 138-139) has proposed the hypothesis that males might preferentially give meat to females in estrus. This would lead to females evolving longer estrus in order to receive more meat.

Strassman (1980, p. 32) argues against Symons' idea that females might have evolved longer estrus to get more meat from males. She states, "However, males who mated only with females in true estrus would have been selected for relative to males who mated with females in either true or sham estrus." This sounds plausible, but is false. Admittedly, a male who can mate at will with any female will be selected to prefer females exhibiting only true estrus. However, such a male must be dominant to be able to mate at will, and even a dominant male may not be able to mate at will once females have evolved to be loyal to males who provision them.

A non-dominant male who restricts his mating attempts to females in true estrus is likely to fight often, but to seldom mate successfully. His genes will be selected against. A male who, if non-dominant, mates with females who may be in either true or sham estrus (he can't tell which) does more mating, and leaves more offspring. Thus, such males can be presumed to have evolved to settle for the less attractive females, those with sham estrus. In existing primates, less dominant males frequently settle for females that are less likely to be fertile (either young, or in early or late stages of estrus) (Goodall 1985).

Strassman goes on to argue "Unless one assumes that such discriminating males were extremely scarce, it is questionable whether

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females who prolonged estrus would have been given more meat and would have been favored by selection." This does not follow. Assume all males are discriminating, but that some males are able to drive non-dominant males away from females in true estrus. Given what we know about ape intelligence (see van Waal 1982, 1989 or Goodall 1985 for descriptions of intelligent social behavior), non-dominant hominids would quickly learn that giving meat to females in true estrus would not be rewarded. They would be driven away from the female before mating. Indeed, even approaching an estrous female guarded by a dominant male would be unwise. The male would probably take the meat.

The obvious strategy for a non-dominant male is to give meat only to females that are not guarded. Such females will be precisely those with the prolonged estrus, not the ones in true estrus. Admittedly, the dominant male or males will give some food to the females in true estrus, but they may not have much if they are devoting more efforts to mating than to provisioning. If more than one such female exists, these females must share the benefit. Since the short estrus females are by definition in estrus for a shorter time, they are likely to receive less meat in total, and are less likely to be reproductively successful.

Indeed, it is the non-dominant males who are most likely to benefit from having meat to provide to females. A dominant male does not need meat to mate with the female of his choice. He can mate at will and keep other males away.

Without meat, a non-dominant male can provide little incentive for a female to mate with him. His non-dominance is evidence of poor genes. At most, she may have evolved to grant an occasional mating to prevent him from harming her young (Hrdy 1981, p. 181), or so that he will provide occasional assistance when it costs him little. However, since such occasional matings involve some risk of sexually transmitted diseases, she may not grant even this much.

However, with meat there is a strategy that existing apes are intelligent enough to employ. Show the meat to the female. Then tempt her to follow you and the meat to a location out of sight of the competition. Give the female the meat and then mate with her. Females would soon learn to cooperate with this strategy, possibly waiting away from the dominant male so that he could not steal the

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meat or guess what was happening.

Admittedly, there is a strategy that dominant males can and would follow to counter this. Never let a desirable female out of sight. This would work. However, it would only work for one female. If there were two, both of whom have an incentive to evade him, at least one is likely to do so. All that is required is to move in the opposite direction to the direction the other female is taking. Faced with a choice as to which female to follow, the male will follow the one most likely to be fertile (the one with the shorter estrus). The less attractive (longer estrus) female gets the meat. In general, unattractive females get more meat. Thus, females evolve to be unattractive.

Of course, non-dominant males are likely to learn which females the dominant male will choose. Rather than risk having their copulations interrupted or prevented, they are likely to learn (or evolve) to prefer the less attractive females.

The above account was written with meat, but would apply if males bring other foods also, or provide other services. Thus, the non-dominant males would limit their food providing to what Strassman calls the sham estrus females.

Strassman emphasizes (p. 34) the choice faced by males between devoting effort to mating or to paternal investment, suggesting one comes at the expense of the other. She is correct. This effect appears to drive her model.

Her bottom line appears to be indicated by (p. 37), "If concealed ovulation evolved because it increased the reproductive advantages that males could gain from paternal effort relative to mating effort." She puts the emphasis on changing male behavior, while the per capita argument puts the emphasis on the share of the male's total investment received by the female and her offspring.

However, a model of her type need not depend on any difference between males in their total paternal investment. In the discussion at the beginning of this paper, all males made the same investment in their offspring, and in the females they mated with. However, the more polygynous males had more females and more offspring, and hence the per capita investment was less. It is, of course, the per capita investment that determined whether the females mated to polygynous males or to non-polygynous males (or

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to polygynous males with fewer females) received more food. Nowhere does Strassman mention this per capita effect.

Effects of Partner Set Size on Total Paternal Investment

Of course, the effect Strassman mentions can occur and probably does. As was pointed out earlier, a very plausible set of numbers makes polygyny desirable for males, but not for the females involved. Females are likely to have evolved behavior patterns that require males to expend much effort to keep them away from other males, if they are not liberally provisioned. Thus, the dominant male is likely to be faced with reluctant females, and be forced to spend much energy in keeping them from other males. This effort is likely to come at the expense of food gathering.

Thus, Strassman's effect likely existed. Males devoting much effort to mating probably devoted less to food gathering, further reducing the benefit of being their mate. However, the primary effect is a per capita one. The more females a male provisioned, the less each received. Indeed, it was the female response to this effect that caused partner set keeping to reduce food gathering as much as it probably did.

Strassman (p. 36) raises the objection that females who prolonged their estrus might be more vulnerable to males from outside the group. While this is probable, males from outside the group do little matings, and this would change the dynamics of the *situation little*.

A dominant's females may actually increase their fitness by being abducted (or seduced) by a male of another band or a lone male, especially if that male has no other mates. They are hence less likely to resist than a non-dominant's (monogamously mated) female. The latter may have her fitness reduced if she goes from being a "wife" of a non-dominant to being one of several females in a partner set. Thus, one of the disadvantages to the dominance/low paternal investment strategy is greater risk of losing females to males outside the band.

The Alexander and Noonan Paternal Investment Theory

The argument presented here is in the Alexander and Noonan tradition (1979). It also argues that concealed ovulation in primates

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living in multi-male troops is likely to evolve only if males make substantial parental investment. It also recognizes that advertisement of ovulation by the female (p. 443) "somehow causes males to gain at her expense." However, the hypothesis here makes explicit which males benefit and how they benefit. The dominant males can impregnate her. Thus, they are the ones that benefit at her expense. Dominant males know when she is fertile, and they can protect her from other males. This ability to monopolize her reproductive services makes her desirable to them. This provides her with better genes for her offspring. However, as pointed out, this theory also reveals a disadvantage to attracting such males. Inclusion in a partner set often brings her less food (or other paternal investment) than would be available from being the only mate of a single male.

The essence of the Alexander and Noonan theory (1979, p. 443) is that "concealment of ovulation evolved in humans because it enabled females to force desirable males into consort relationships long enough to reduce their likelihood of success in seeking other matings, and simultaneously raised the male's confidence of paternity by failing to inform other, potentially competing males of the timing of ovulation." This then increased the total male paternal investment. The theory put forward here does not depend on changing the male incentive to make paternal investments. Instead, it presumes that the males have already evolved to invest paternally through provisioning females, probably as a result of the emergence of extensive hunting. Instead, it operates primarily through affecting the share of paternal investment received by the female. If the phase "potentially competing males " is replaced with "stronger, more dominant males" the latter part of the Alexander and Noonan statement is consistent with the theory of this paper.

The Alexander and Noonan theory is also subject to more technical critiques. They argue that concealing ovulation "would be most likely to be successful for females perceived by males to be of unusual value as mates". However, it is argued here (following Strassman's suggestion) that it is the less attractive females who are most likely to be the beneficiaries of paternal investment, simply because provisioning males encounter fewer problems in courting them. They hence receive more per capita.

In contrast to the Alexander and Noonan argument, Hrdy (1981)

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has a theory in which ovulation became concealed to facilitate cuckoldry (notice the contrast with other theories where it is supposed to contribute to paternity certainty) and to confuse paternity. This would cause other males in the group to avoid harming the female's infant, and perhaps cause them to provide assistance when they could do so at low cost, such as by providing protection or political support.

Her mechanism for preventing male infanticide is unlikely to be needed in primitive hominids, since other mechanisms are likely to exist. With language, the mother of a baby can tell others what happened, and organize resistance by the other females. With a high probability of retaliation, killing infants ceases to be a successful male strategy. Thus, it would stop exerting selective pressure for concealing ovulation to facilitate female matings. Also, mating with numerous males increases the risk of sexually transmitted diseases, and is thus a relatively expensive strategy.

However, in a more general sense a female might benefit from mating outside the pair bond. One can imagine males who might have fathered her child coming to its assistance, especially if there is little risk to them involved. For instance, a dominant male might be inclined to assist offspring that might be his over those that certainly were not. Hrdy is correct that concealed ovulation can facilitate cheating by making the male's job harder.

Hamilton (1984, p. 331) provides another contrast to the Alexander and Noonan hypothesis. He appears to attack Alexander and Noonan for an interpretation that estrous swellings must be associated with low paternity confidence, suggesting that in baboons the swellings are associated with high paternity confidence by the dominant male. He points out, correctly, that advertising estrus may promote paternal certainty by lowering the dominant males' total costs of protection. They expend less total energy if they need worry only during the period of estrus. They can thus afford to provide more intensive protection.

He argues that there is no plausible path from partner set polygyny to contemporary human organizations. He raises the question of whether there is a transition route from estrous swellings to non-estrous swelling and more paternal care. The argument seems to be that if swelling adds to a dominant male's paternity confidence,

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reducing the swelling must reduce the dominant male's paternity confidence (correct). He then argues that because dominant males provide some paternal care, females could not increase their receipt of paternal care with less swellings.

Here he goes wrong. While weakening the signal to the dominant male will reduce his incentive to provide paternal care, lengthening the signal still can increase the paternal care received. How? By causing the care to be provided by a less dominant male who spreads his care out over fewer females, and who hence can give each female more care. Thus, the above model deals with Hamilton's problem.

If different authors can disagree about whether concealing estrus increased or decreased paternity certainty, and each can tell plausible stories for their outcome, it is very likely that in some circumstances it contributed to paternity certainty and in other circumstances it did not. Concealing ovulation lengthens the period over which the female must be closely watched and protected to insure paternity. In the case Alexander and Noonan had in mind, males respond by lengthening their period of close observation of the female, preventing them from courting other females, and monogamy emerges.

However, another outcome can be imagined. Some authors have tried to explain the disappearance of estrus by arguing that it decreased paternity certainty. As estrus lengthens, the male strategy of protecting the female during the whole period can become impractical, causing him to leave her unprotected. This lowers his paternity confidence, rather than increasing it.[10]
The male response will depend on the effects on his reproductive success of continued close watching versus devoting the time to other activities, including mating with other females. Which it does depends

[10] Inducing such a shift in male strategy is probably in the female's interest. It makes it easier to mate with other males, which benefits her, especially if her mate is infertile. These other males may also have superior genes. By causing her mate to seek food continually, rather than staying near her when she is in estrus, it increases her food supply and promotes her fitness. While, the lowered confidence of paternity may reduce slightly his incentive to provide paternal investment, this effect is likely to be minor. Thus, there remains an incentive for females to evolve concealed ovulation when the male response would be to reduce his monitoring.

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on the circumstances, and on whether the males respond by increasing or decreasing their guarding activity. Very likely, the selective pressure exerted by paternity certainty considerations were on net weak, and did not play a major role in selection for the length of estrus. It also varied by the type of male. A dominant male, able to use his strength to mate with any female he chooses, will quit defending the long estrus or no estrus females from other males.

In the Alexander and Noonan account (and in other accounts), concealed ovulation appears to be viewed as a necessary step to evolving paternal investment, giving the male enough paternity certainty so that a male employing a high paternal investment strategy out reproduces other males. In contrast, the proposed theory presumes that males are already making paternal investments, and shows how estrus disappears. All that is needed for paternal provisioning is for hunting to become efficient enough that males regularly have, or can readily acquire, surplus meat.

If reasonably large animals are hunted, a single kill will supply more meat than the male can eat before it spoils (especially in a tropical climate). It will cost the male little to use the excess meat to purchase sexual access. Giving the excess meat to females contributes to his reproductive success in several ways. One is it facilitates sexual access. The other is that if the female has had any offspring by him, the extra meat promotes their growth and survival. Finally, extra meat may help the females to put on weight and become more fertile. The last two increase the males reproductive success only if he adopts a strategy of giving the excess meat to females that are reasonably loyal to him, and hence likely to have borne, or to bear in the future his offspring. In turn females are likely to provide him with paternity certainty only if he is consistent in provisioning them. This suggests that females will evolve a tendency to pick one male and to mate preferentially with him (or at least to conceal any matings with other males), and that males will evolve a tendency to preferentially provision a single female. This is probably the origin of the pair bond.

There is an apparent problem in theories in which high paternity certainty is necessary for paternal investment. How does the certainty emerge? If the environment is such that females mate with only one male (perhaps because the male can keep other males away), the high paternity probability can be assumed, and one can see how paternal

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investment is likely to emerge. However, in many circumstances, the optimal male strategy is to mate widely. While they may devote some effort to keeping other males away from estrous females, it is likely to be difficult, and they will have only a moderate certainty of paternity. This appears often to be the situation for primates living in multi-male groups, such as chimpanzees (see de Waal, 1982, 1989). While a high investment/high certainty of paternity strategy may be superior to a low investment/low paternity certainty strategy for groups, it is not clear in all theories how a transition is made from one to the other by natural selection acting on individuals. The theory here accounts for the transition by individual level natural selection.

Other Theories

There are other theories to explain concealed ovulation. Daniels (1983) has argued that concealed ovulation emerged to eliminate the disruptive effect of revealed ovulation on a social group. She argues that it emerged when humans quit living as couples and families and begin to band together in groups. One problem with this theory is that there is no reason to believe humans ever lived in other than multi-male groups. This is how our closest relatives, the chimpanzee and the bonobos live, and the fossil evidence is consistent with early humans living that way.

However, the Daniels effects may exist and could have contributed to the concealment of ovulation. However, since the effect of one individual's ovulation on group functioning is likely to be small, and the benefits extend to the group's other females, her theory approaches one of group selection. Thus, her mechanism is likely to be too weak. It at best supplements other mechanisms.

Spuhler (1979) has tried to explain concealed ovulation by endurance hunting leading to selection for both bipedalism and enlarged adrenal and thyroid glands. These glandular changes then produce the concealed ovulation. The theory has a problem. Suppose one agrees that if everything were unchanged, the glandular changes could produce these effects. It is still necessary to explain why, after the glandular changes, the advertisement of ovulation was not again selected for. If it were in the reproductive interests of females to advertise when they could be made pregnant, surely other mechanisms could have emerged. The real problem is to explain why

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advertising of ovulation is advantageous for some primate females, but not for humans.

Finally, there is the traditional hypothesis that concealed ovulation was a device for facilitating the pair bond (Morris, 1967, for instance). Supposedly, humans evolved to have frequent sex to assure that the male would remain near the female and assist in raising the offspring. The problem with this hypothesis is that if high male paternal investment were in the male's reproductive interest, he would have evolved to invest without the incentive of continual sexual pleasure. Indeed, the energy expended in frequent sexual activity with a bonded mate would contribute more to reproductive success if devoted to investing in the offspring. Other monogamous primates appear to maintain the pair bond without a high level of sexual activity (Hrdy, 1981, pp. 141-142), suggesting that other mechanisms can maintain the pair bond, and could have emerged in humans. Benshoof and Thornhill (1979, p. 100) point out that estrus has been retained in marmots, titi monkeys, gibbons, and the siamang, all of which form lengthy pair bonds. This suggests that eliminating estrus is not necessary to maintain pair bonds.

An alternative mechanism to explain the high level of sexual drives found in humans would emphasize the advantages to the female of an occasional mating with other than her regular mate to protect against his sterility, and possibly to obtain better genes for her offspring. Female sexual desires facilitate such activity. The male response is an even higher sexual drive in order to exploit any opportunities the females may present for copulations, and to win sperm competition with any males who do mate with their wives. (See Small, 1988 or Miller, 1992 for more on this).

Burley (1979) has asked why female ovulation is concealed not only from males but from the females themselves. Her solution is that intelligent females would have discovered the disadvantages to pregnancy and child bearing, and would have used their knowledge of when they could get pregnant to avoid intercourse then. Thus, knowledge of the timing of her ovulation came to be concealed from the female in order to prevent this behavior.

There are several alternative answers to her question. The most plausible is that self knowledge disappeared as a byproduct of the disappearance of whatever physiological changes made ovulation

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visible to males. There is probably no separate evolutionary event to be explained. Secondarily, the evolution of revealed ovulation for females would probably have required the evolution of new sense organs in the females body. Even if there were benefits to such an organ once coupled with appropriate behaviors, there probably has not been time for humans to have evolved the required organ and behaviors. If they did evolve, it is not clear that females would not reveal the timing of their ovulation inadvertently to males, given the general difficulty in keeping secrets. Finally, there are other evolutionary devices, most of which consist of merely elaborating behavioral tendencies already existing, which could make pregnancy and child rearing more attractive to females if they otherwise had a tendency to do too little of it.

Stoddart (1986) argued that the odors that likely were associated with female estrus made it very hard for a male to leave camp for hunting without risking that his mate would experience estrus, and by revealing her state by odors, cause other males to impregnate her. He suggests that this problem was eliminated by humans losing the ability to detect estrus related odors. Unfortunately, as expressed, his hypothesis is a group selection theory that fails to explain why males who could not detect such odors would have out reproduced males who could detect them. It would seem that a male who could smell estrus would be able to benefit in protecting his mate from other males, in impregnating her, and in taking advantage of the estrus of other men's mates to optimally time seductions or rapes. The problem he poses could have been resolved by females losing their distinctive odors, thus increasing the probability of paternity for their mates, benefitting by greater provisioning and larger numbers of offspring. However, loss of ability to detect fertility in females may have prevented males from being distracted from provisioning their mates, and thus facilitated creation and maintenance of pair bonds. It is hard to imagine a male maintaining a pair bond, if his sense of smell was creating a strong desire to copulated with another female and destroying his desire to copulate with his mate.

Grammer (1993) presents evidence that human female's perception of the smell of androsterone from males varies over their cycle, which he interprets as consistent with loss of estrus serving to facilitate copulations outside of the pair bond.

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After this paper was written, it was discovered that Knight (1991, p. 219) also argued that it was in early women's interest to avoid inclusion in a dominant male's partner set, and that concealing ovulation might help her do so.

Finally, a rather intriguing possible explanation for concealed ovulation is to facilitate sex at all stages of the cycle, but the purpose may not be to strengthen the pair bond but to assist the female's reproductive system in determining whether there is male available to assist in rearing the offspring. Research by Cutler, and others (1991) shows that females are more fertile with regular copulation, and with the physical closeness to a male that permits smelling his pheromones. However, the full development of this idea requires another paper, which has been written (Miller, 1996).

Conclusions

This theory provides a coherent account of how human females lost estrus when efficient hunting appeared. Males evolved the pattern of sharing meat with females who rewarded them with copulations, and females evolved to so reward them. Females who were in a dominant male's partner set received less meat per capita, and thus left fewer descendants. While previously advertising ovulation through estrus led to mating with the genetically superior dominant males, now being unattractive to dominant males permitted pair bonding with less dominant males, who provided more meat per capita. Females were then selected to conceal ovulation.

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Sir Francis Galton, F.R.S.
With Biographical Introduction by Roger Pearson

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As their demographics change, many Western nations face new and unfamiliar problems peculiar to heterogeneous societies. Defining basic fairness, for instance, is more complex in a multi-cultural, multi-ethnic, and multi-racial country, such as the United States, than it is in a homogeneous country like Japan.[1] In the U.S., currently more heterogeneous than most Western nations, individuals increasingly identify themselves no longer as Americans, but as African-Americans, Hispanic-Americans, Asian-Americans, etc. [The government has adopted and even seems to encourage this nomenclature.] These people often define fairness in terms of their group, rather than in terms of individuals or society as a whole. In every field of endeavor, under-represented minorities look for inequities and when they think they find them, they demand "fairness," i.e., equal representation. They ask questions such as: Is it fair that members of our group, 13% of the population, only make up 3% of the nation's lawyers? In institutions of higher learning, and especially for elite, graduate, and professional schools, individual competition for openings become complicated by the demands of under-represented minorities for set asides or proportional admissions. In the United States, one response to those demands and questions had been affirmative action, widely used by academically selective American universities to diversify student enrollment. Other

[1] In 1950, the population of the United States was 88% white, 10% African-American, and 2% other. Today, its population is 71% white an 29% minority. By 2050, demographers predict that whites, reduced to 49% of the American population, will simply be the largest minority group. Japan, in sharp contrast, has a minority population of less than 1%, allows virtually no immigration, and will in all likelihood remain unchanged ethnically and racially into the foreseeable future. Western European nations appear to be following the American model.

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Western nations are now being confronted with similar minority demands; consequently, citizens of those countries might find an examination of its impact of some interest.

This paper presents an analysis of LSAT[2] scores and admissions into ABA-approved law schools[3] by ethnicity. Some findings are: (1) Between 1990 and 1993, admissions for white students decreased 6.8% while admissions for all other ethnic groups increased between 14.3% and 89.9%. (2) Whites and Asian/Pacific Islanders score higher on the LSAT than other ethnic groups; Puerto Ricans and blacks score lowest; Chicanos, Hispanics, and American Indians score in the middle range. (3) Although law schools in general appear to be practicing a preferential admissions policy, sometimes called race-norming, admissions for low-performing groups are still below their proportion in the U.S. population. (4) If LSAT scores were the sole criterion for law school admissions, white admissions would increase 14.1% and Asian/Pacific Islander 4.4%; protected class minority admissions would decrease by 10.5% to 47.6%.

Total Applications, Admissions, and Qualifications

In the United States, there are 177 ABA-approved law schools, all of which officially require applicants to submit to the LSAT. According to law School Admission Services (LSAS), for the 1990-91 academic year, 92,648 LSAT test takers applied to law school, 51,866 were admitted, and 41,485 actually registered[4] (LSAS, 1992). For 1993-94, 89,633 people applied, 53,117 were admitted, and 44,000 enrolled (LSAS, 1995). Because of changes in record keeping and reporting, this data is a little misleading. LSAS warns: "Prior to

[2] The Law School Admission Test (LSAT) is published by the Law School Admission Council, Inc. and administered by Law School Administration Services. The LSAT measures two dimensions: (1) analytical reasoning and (2) verbal reasoning plus reading comprehension. Quantitative aptitude/achievement, an important part of the SAT, ACT, GRE, and GMAT, is not tested.

[3] The American Bar Association accredits 177 law schools. There are a small number of non-ABA-approved correspondence schools. However, the only state to allow students from such schools to test for the bar is California, which is also known to have the toughest bar exam (Bear, 1995).

[4] The data for applicants, admissions, and enrollment used in this paper are from 176 of the 177 ABA-approved law schools.

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1991-92, only those applicants with both an LSAT score and a GPA on file were included in the profiles. The inclusion in the profiles of applicants with missing data results in lower admission ratios than if they were excluded. Therefore, please be careful in making cross year comparisons using past years' profiles (LSAS, 1995)." When comparing relevant data for these two periods, it was a simple matter to eliminate applicants and admittees without LSAT scores on file, nonstandard LSATs, or LSATs with different scales[5].

Initially, as part of this paper, the author wanted to evaluate long term trends in applicant and admittee performance on the LSAT. LSAS replied to the author's inquiry, as follows: "The type of data included here is not available for 30 years. Counts of total number of LSAT administrations are available for many years. These are, however, highly duplicated counts of people, since a person who tests at two different administrations within a testing year is counted as two tests administered. Further, not everyone who tests applies to law school and even among those who do apply, not all apply in the same year in which they test. Because this count of tests administered is not a person count, no subgroup counts are available. The only count available is for tests administered for a testing year." LSAS supplied data for two academic years, 1990-91 and 1993-94, both of which were received in January 1996. Without data, analyzing long term trends was impossible.

Law Schools have different admission standards. The ten elite law schools (Harvard, Yale, etc.), for instance, are the most prestigious and most selective. Except for affirmative action admissions, they admit only applicants in the top one or two percent of LSAT scores, or above 170 on the current 120-180 scale (Herrnstein and Murray, 1994). Since 56% to 60% of all applicants to law schools are admitted, some lower tier law schools have first year student populations with average LSAT scores of 155, or about

[5] These numbers weren't reported for 1990-91; therefore, it seemed appropriate to exclude them for 1993-94. Law schools admit a very small number of people without LSAT scores in their files. For 1993-94, they admitted 80 of 752 applicants without LSAT scores of whom 38 actually enrolled (LSAS,1995); 752 is 0.008% of all applicants.

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Table 1. Ethnic Trends in Law School Admissions, 1990-91 to 1993-94.

Ethnic Group	Number of Admissions 90-91	93-94	Change	Percent Change
Amer. Indian	301	382	+81	+26.9%
Black	3,429	3,943	+514	+15.0%
Chicano	629	803	+174	+27.7%
Hispanic	1,352	1,545	+193	+14.3%
Puerto Rican	370	652	+282	+76.2%
Asian/P.I.	2,304	3,221	+917	+39.8%
White	42,259	39,382	-2,877	-6.8%
Other	666	1,264	+598	+89.8%
All Non-Whites	9,051	11,810	+2,759	+30.5%
All Admissions*	51,866	51,485	-381	-0.7%

* 1993-94 figures don't include 1,632 admissions with no LSAT on file, nonstandard LSAT, or older version of LSAT. This data wasn't reported for 1990-91.

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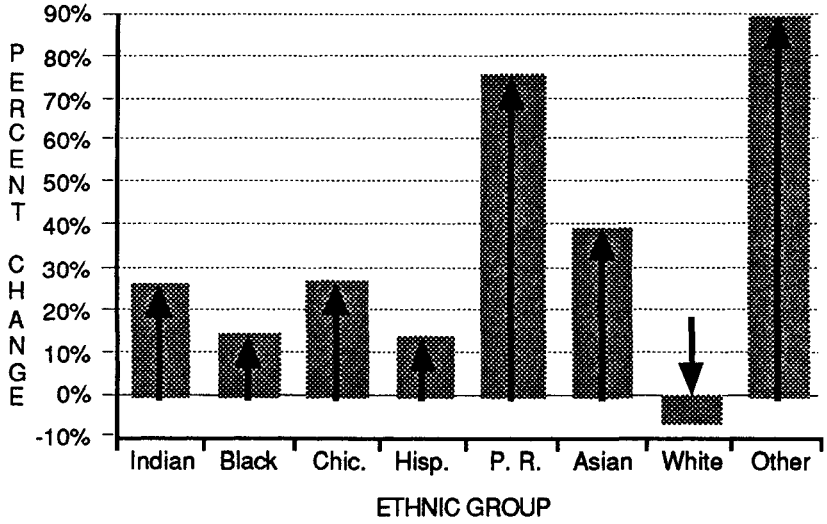
Figure A. Ethnic Trends in Law School Admissions, 1990-91 to 1993-94.



Source: 1990-91 and 1993-94 National Decision Profiles, Law School Admission Services

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Table 2. U.S. Student Population, 1992

Ethnic Group	Number Students	% of All Students	% of U.S. Population
Am. Indian	113,713	0.8%	0.8%
Asian/P.I.	637,151	4.6%	4.0%
Black	1,335,388	9.6%	12.2%
Hispanic	866,572	6.2%	9.0%
White	10,989,776	78.8%	71.0%
Other	not listed	-	3.0%
Total Am.	13,942,600	100.0%	100.0%
Foreign	416,353		
Grand Total	14,358,953		

Source for Student data: *Almanac Issue, Chronicle of Higher Education*, August 25, 1993

Table 3. Blacks Applying & Admitted to Law School in 1990-91.

Decile Range	% Black Applicants per Decile	# Black Applicants in Decile	% Blacks Admitted per Decile	# Blacks Admitted in Decile
91-100	1.4%	108	2.9%	101
81-90	2.3%	179	4.8%	167
71-80	2.0%	157	4.3%	148
61-70	3.4%	265	6.5%	226
51-60	4.8%	380	9.5%	329
41-50	6.5%	508	11.4%	395
31-40	8.1%	640	12.9%	447
21-30	15.9%	1,251	19.9%	692
11-20	21.4%	1,680	17.5%	610
0-10	34.3%	2,697	10.4%	363
Totals:	-	7,865	-	3,478

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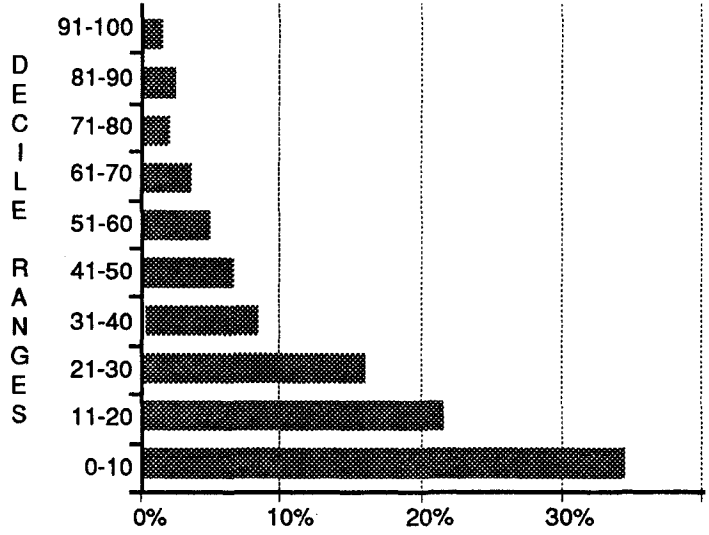
Figure B. Percentage of Black Applicants within each LSAT Decile, 1990-91



Source: Appendix A, *Thinking About Law School: A Minority Guide*, 1992, Law School Admission Services

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average for all admittees.

Almost all law school applicants apply to more than one school. For instance, in 1993-94, there were 89,633 applicants and 422,021 applications, or 4.71 applications per applicant. This, of course, leads to numerous situations where several law schools accept the same applicant. In 1993-94, law schools sent out 128,589 acceptances, or 1.43 per applicant. Some applicants received two, three, four or more acceptances, or an average of 2.42 acceptances for each successful applicant. About 36,000 applicants received no acceptances. An example: In Table 1, law schools admitted 301 American Indians in 1990-91, but those 301 American Indians may have received 700 acceptances. The numbers cited in this paper are for applicants and admittees.

Factors to keep in mind about the data used in this analysis and the results of the analysis itself are: (1) Many test takers never apply to law school or do so in a year after taking the test. (2) Some applicants take the LSAT more than once, sometimes in the same year. (3) Many applicants apply to more than one law school. (4) Law schools admit more applicants than they have space for, recognizing that not all those they admit will actually enroll in their program. (5) Neither the data nor the analysis provides any information on the success (graduation) or failure (drop out) rate of those who enroll. (6) The LSAS data used in this study is composite information from virtually all ABA-approved law schools, and, therefore, can't be applied to any one school. (7) In addition to LSAT scores, law schools use prior university GPA and other subjective criteria in admission decisions. (8) When making admission decisions, law schools may weight criteria differently.

For the following reasons, this paper focuses on LSAT data related to applications and admissions in the decision making process of law schools. At the beginning, people interested in a law career decide to take the LSAT. After taking the test, test takers decide if and where they will apply to law school. The decision-making ball then goes to the law schools. They make admissions decisions based on the number and qualifications of those applying and their own decision making criteria. Therefore, the number of applicants and

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the qualifications of the applicants from which they may choose is relevant to an evaluation of their decision making. LSAS, with its National Profiles, reports LSAT scores and prior GPA, the objective criteria. Since this study is interested in how LSAT scores correlate with admissions, it will ignore prior GPA. GPA, although an important criterion that appears to correlate well with success in law school, varies according to curriculum taken (engineering, history, business, etc.), the level and standards of the undergraduate or prior graduate school attended, grade inflation factors that vary according to school, personal discipline and maturity, extracurricular activities, outside workload, etc. In this sense, GPA requires a subjective evaluation or interpretation and law schools weight them according to some of the factors just mentioned. The LSAT, on the other hand, is a standardized test taken under uniform conditions. It is the one thing that all applicants to ABA-approved law schools have in common. Finally, law schools' decision-making results (i.e. whom they admit) reflect, or give some indication of, the school's admission policies. Once admitted, the decision to accept admission or enroll is the students'; the ball is once again in their court.

Ethnic Admission and Population Trends

Keeping in mind the many qualifications that must be expressed, from 1990 to 1993 the total number accepted appears to have remained stable while the number of ethnic acceptances has risen dramatically. As Table 1 shows, once admittees with no LSAT, nonstandard LSATs, or those who have taken the previous version of the LSAT[6] have been removed from the total , the difference over the three year period is only -0.7%.

More importantly, Table 1 shows that the number of whites accepted has dropped by 2,877 (6.8%), while total non-white acceptance has gone up 2,598 (30.5%). Figure 1 illustrates that admissions have gone up for each minority group, but not for whites. Table 1 includes admission numbers for each of the major

[6] This type data was reported for 1993-94, but not for 1990-91.

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racial/ethnic groups and for "Other," evidently a catch all for racial and ethnic groups too small to report individually. With a 89.9% increase, Other represents the fastest growing group and Puerto Ricans are next with a 76.2% admissions increase.

For a perspective on the admission numbers discussed, some idea of the proportions of each ethnic group in the U.S. student population and the American population in general may be useful. The student numbers presented in Table 2 were compiled for *Chronicle of Higher Education* and should be fairly accurate. However, there are several problems. First, they seem to have forced all American students into one of five ethnic/racial categories; for instance, they have no "Other" category. Second, the Hispanic classification includes Chicanos (Mexican-Americans), Puerto Ricans, and Hispanics (primarily Cuban-Americans). The proportions for the U.S. population have been adjusted somewhat from 1990 U.S. Census numbers to reflect continuing demographic trends. Hispanic-American and Asian-American are the fastest growing parts of the American population; whites are the slowest growing. Student-age population ratios probably vary from overall population ratios; Hispanic-American, black, and probably Asian-American populations are younger on average than the aging white population. However, with all this considered, the rapid changes in ethnic admissions appear to be too large to reflect a corresponding change in the U.S. population at large. American demographics are changing, but it is doubtful that they are changing that fast.

Preferential Admissions

Since at least the mid 1970s, preferential admission policies in law schools have been public knowledge. In 1976 John Dobbyn, a law professor and member of the law school admissions committee at Villanova University, wrote: "In the case of many law schools, the blocks[7] indicating acceptances with lower grade-point averages and

[7] These blocks are the spreadsheet cells in Decision Profiles, which law schools compile for their own applicants and admissions and which Law School Admission Services compiles nationally. For some years, these profiles have included data by ethnicity. In 1995, LSAS started including data by gender.

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LSAT scores reflect nothing more than the policy of the school in admitting applicants from minority groups on a separate standard. While the chart may seem to indicate that someone with a GPA of 2.50 and an LSAT score of 500[8] stands a fairly good chance of acceptance, the fact may be that a non-minority with those scores would stand virtually no chance at all. In some cases, the law schools specify in a footnote that minority acceptances are, or are not, included in the charts. In other cases, you can only infer the existence of minority acceptances from the scattering of a relatively small number of acceptances at GPA and LSAT ranges substantially below the point at which the bulk of acceptances begin to concentrate." (Dobbyn, p. 8)

D'Souza (1992, p. 18), Taylor (1992, pp. 180-181, 199), Herrnstein and Murray[9] (1994, pp. 450, 455-456), and Bunzel (1996) have more recently documented affirmative action in law school admissions. In 1992, Missouri's Coordinating Board for Higher Education adopted a goal that reflects that state's (and many other states') dedication to affirmative action. One of its four "Measures of Success" is: "Minorities will participate and succeed in Missouri's system of higher education in proportions at least equal to their representation in the state of Missouri (Task Force, p. 4)." This appears to be a clear mandate by the highest educational officials in the state for race norming. Missouri is not atypical and law schools are not immune to such political and social pressure for equal educational results.

Law schools admit students by LSAT scores, GPA, and a number of subjective criteria determined by the school. Since the beginning of the Great Society, race and ethnicity have increasingly

[8] Since 1976, the scoring methods for the LSAT have changed at least twice. After Dobbyn's book was published, LSAS switched to a 10-48 point scoring scale. In June 1991, it switched again, this time to a 120-180 point scale. This fairly frequent changing of scoring methods makes long-term trend analysis difficult.

[9] *The Bell Curve*'s Chapter 19, "Affirmative Action in Higher Education," (pp. 447-477) provides an in-depth and balanced discussion of the whole issue.

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become the most important "subjective" criteria[10] for admission to institutions of higher education, including law schools. This is widely recognized by those involved in law school admission process. For instance, the Law School Admission Service, administrator of the LSAT, publishes and distributes free of charge a book to minority test takers. *Thinking About Law School: A Minority Guide*, encourages minority students to pursue law school and informs them than their ethnicity and race work in their favor. Chapter 9, entitled "Behind the Scenes: The Admissions Office," contains a list of "...specific criteria that law schools consider when making admission decisions...", including "your minority status." (LSAS, 1992, p. 57)

In response to societal pressure, selective colleges and universities.[11] including many law schools, use race-norming to attain the desired representative enrollment. Race norming requires admittance of students according to their ethnicity in an attempt to reflect ethnic proportions of the general population. If, for instance, blacks are 13% of the regional or state population, a state university may seek to admit 13% blacks each year. This often requires ignoring individual merit implicit in such criteria as scholastic aptitude tests or previous grade point average.

In addition to mini-biographies of successful minority attorneys, *Thinking About Law School: A Minority Guide*, contains an appendix with "Decision Profiles" for most recognized American minority groups (LSAS, 1992, pp. 93-97). These 1990-91 profiles present detailed information in a spreadsheet cell format on the number of applicants to ABA-approved law schools and the number admitted by

[10] Gender appears to have become an important criterium for law schools. For the first time in its 1993-94 report, LSAS provided a break down of LSAT scores for males and females. A literature search back to 1993 produced one article entitled "The Law School Gender Gap," which claims that female law students get lower grades than males even though they enter with virtually identical credentials. There were also several articles about a "glass ceiling" for female attorneys, a gender earnings gap, and a higher proportion of female attorneys (72%) leaving their firms compared to men (56%).

[11] Selective schools usually require a minimum score on a scholastic aptitude test, such as the SAT, ACT, GMAT, GRE, LSAT, etc.. They water down this requirement by allowing ten percent exceptions to the rule. Non-selective schools, usually state universities and community colleges, admit anyone with a high school diploma or GED; this is called an "open admissions" policy.

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LSAT percentile rank and undergraduate grade point average (GPA). The percentile ranks are actually deciles, each representing 10% of all test takers. Table 3 shows the percentage and number of black applicants and admittees in each decile. Ten percent of all applicants scored in the top decile, 91-100, compared to 1.4% of black applicants. Ten percent of all applicants scored in the bottom decile, compared to 34.3% of blacks. Figure B compares black applicants' decile scores (horizontal bars) with all applicants (vertical 10% line).

Over eighty-six percent of black applicants placed in the bottom half of all test takers with over one-third scoring in the bottom decile. Of the blacks admitted to law school 72% scored in the bottom half. American Indians, Chicanos, and Hispanics did better, but below the combined average for both applicants and admittees. Asian/Pacific Islanders were the only minority group that apparently did as well or better than the average for all applicants. The Minority Guide did not report data for whites or Puerto Ricans.

Although some people may think of preferential policies in terms of blacks and whites, it is important to remember that they are now applied to most non-white racial groups, handicapped people, and by gender. The U.S. government and politically-active citizen groups monitor the educational establishment to encourage admissions by group status instead of individual merit.

The 1990-91 Profiles

Table 4 provides a summary of the ethnic data in the 1990-91 National Decision Profiles. During this period, the LSAT was still scored on a 10-48 point scale. The profiles detailed scores in nine ranges of five points each, i.e., 10-14, 15-19, 20-24, etc., up to the top three point range of 46-48. The report did not provide average scores or standard deviations. The author calculated the mean scores for both applicants and admittees from the ranges provided by LSAS. Because they aren't calculated from the original data, they are shown as "estimated." The profile report for 1993-94 gave a mean of 33.9 for the 1,840 applicants who had previously taken the 10-48 point scale LSAT. The estimated mean for All applicants in Table 4 is 33.3, indicating the author's calculation is reasonably close. ["All,"

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as it is used here, represents the total for the various ethnic groups.]

Standard deviations were estimated by assuming a normal distribution for All applicants and All admittees and finding the two percentile break point at the top end of the scale. The distance from that break point to the average was divided by two to obtain an approximation of the standard deviation. (Figure C, explained later, shows the standard deviations for the 1993-94 profiles.) The estimated standard deviations are 6 for All applicants and 5 for All admittees[12].

The first column in Table 4 lists the various ethnic groups and includes a total row labeled "All." Column 2 gives the number of applicants in each group; 502 American Indians applied that year and there were 92,548 total applicants. The third column gives the percent of ethnic applicants of all applicants; 4.1% of all applicants were Asian/Pacific Islanders and 80% were white. Column 4 gives the number of those admitted from each group; law schools sent acceptances to 1,352 Chicanos and 370 Puerto Ricans. Column 5 shows the percent of each group admitted of All admitted; the 3,429 blacks out of a total of 51,866 admitted is 6.6%. The sixth column shows the proportion admitted within each ethnic group; the 3,429 blacks admitted out of 7,312 applicants is 46.9%. The last two columns, 7 and 8, give the estimated mean scores for each group; the mean for white applicants is 34.3 and the mean for Hispanics admitted is 33.3.

The data in columns 6 and 8 reveal a probable pattern of race norming. Assuming everything else equal (GPA and subjective criteria), the admissions mean (column 8) of the various groups would all be around 36.2, the mean for All admitted. Instead, they vary from up to 1.58 standard deviations. The standard deviation gaps from the white mean is Asian/Pacific Islander -0.18, Other -0.24,

[12] Another LSAS document, the "Candidate Report" sent to all LSAT test takers, provides tables for both the 10-48 and 120-180 scale versions. Those tables present percentile data for all test takers, instead of just applicants and admittees. An evaluation showed means lower that those presented in the National Decision Profiles and wider standard deviations than those estimated in this paper. Evidently many test takers, discouraged by their low scores, do not apply to law school.

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Chicano and Hispanic -0.74, American Indian -0.82, Puerto Rican -1.38, and black -1.58. This corresponds rather well with other reported data. For the 1992 LSAT, Barnes and Carr, as reported by Herrnstein and Murray (1994, p. 455), give the following differences from the white mean: Asian/Pacific -0.32, blacks, -1.49, and Latinos[13] -1.01.

Column 6 shows a pattern of law schools accepting the same proportion (about 55-60%) of applicants from each group. Since law schools admit 56% of All applicants, a race norming pattern would show about 56% admissions for all groups regardless of LSAT scores. Except for the very low scoring blacks and Puerto Ricans, that is what occurs. Although whites' admission mean is higher on average, a greater proportion of Asian/Pacific Islanders (60.9%) and American Indians (60.0%) are accepted than whites (57.0%). The Chicano acceptance rate (55.8%) is only slightly lower than whites and the Hispanic rate (56.8%) is virtually the same. A fair, or non-race norming pattern would show a direct and strong correlation between mean LAST score for those admitted and the proportion admitted. The actual pattern shows discrimination against whites, a slight preference for Asian/Pacific Islanders, and a distinct preference for the other minorities.

The 1993-94 Profiles

Table 5 provides the summary for the 1993-94 National Decision Profiles. In June, 1991, LSAS switched to a new 120-180 scale with 12 reported ranges instead of ten. This change seems to provide more definition at both ends of the scale, but more importantly at the highly competitive top end. The estimated standard deviation, calculated as before, is 8 for applicants and 7 for admittees. Column 8 shows about the same pattern as in Table 4's column 8, except the Asian/Pacific Islander mean is now slightly above the overall average,

[13] The term "Latinos" appears to represent Chicanos, Hispanics, and Puerto Ricans. Chicanos are Mexican-Americans; Hispanics include Cuban-Americans and probably some other Spanish speaking groups; Puerto Ricans are sometimes further divided into those still residing in Puerto Rico and those residing in the continental U.S. According to the 1990 U.S. Census, more Puerto Ricans live in the continental U.S. than in Puerto Rico itself.

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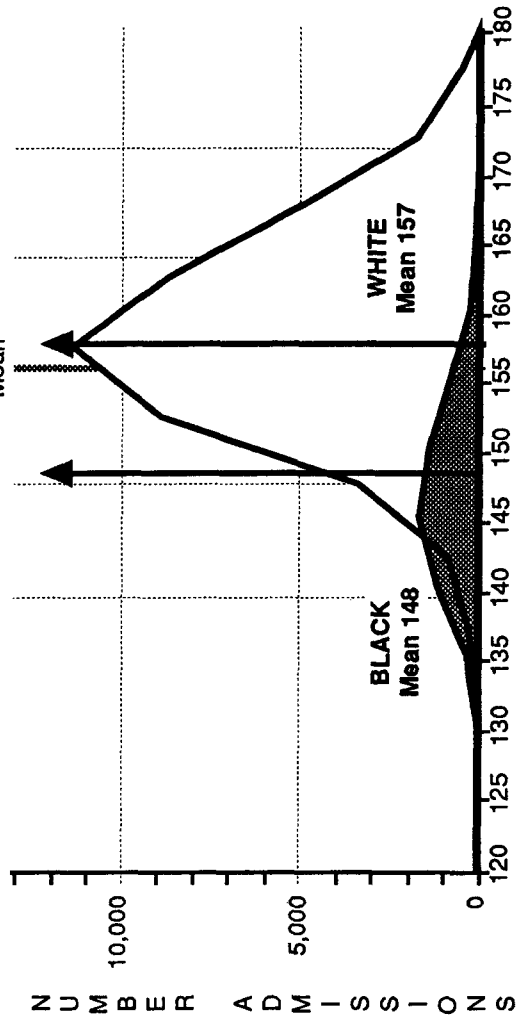
Figure C. Law School Admission Curves for Blacks & Whites, 1993-94



Based on admissions data in Table 6.

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Table 4. Ethnic Summary of 1990-91 National Decision Profiles, 10-48 Scale

1	2	3	4	5	6	7	8
Ethnic Groups	Number of Applicants	Ethnic % of All Applicants	Number Admitted	Ethnic % of All Admitted	Admitted % Ethnic Applicants	Estimated Mean of Applicants	Estimated Mean of Admitted
Am. Indian	502	0.5%	301	0.6%	60.0%	30.2	32.9
Black	7,312	7.9%	3,429	6.6%	46.9%	24.9	29.1
Chicano	1,127	1.2%	629	1.2%	55.8%	29.6	33.3
Hispanic	2,382	2.6%	1,352	2.6%	56.8%	30.0	33.3
P. Rican	1,128	1.2%	370	0.7%	32.8%	23.9	30.1
Asian/P.I.	3,781	4.1%	2,304	4.4%	60.9%	33.4	36.1
White	74,100	80.0%	42,259	81.5%	57.0%	34.3	37.0
Other	1,294	1.4%	666	1.3%	51.5%	31.9	35.8
All	92,648	100.0%	51,866	100.0%	56.0%	33.3	36.2

LSAS did not provide a mean in its 1990-91 National Decision Profiles (LSAS, 1992). However, it did report a mean of 33.9 for 1,840 applicants in 1993-94 who took this version of the LSAT (LSAS, 1995). The estimated mean of applicants and admitted in this table were calculated from ranges given in the 1990-91 National Decision Profiles. The standard deviation is estimated at 6 for applicants and 5 for admssions.

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Table 5. Ethnic Summary of 1993-94 National Decision Profiles, 120-180 Scale

1 Ethnic Groups	2 Number of Applicants	3 Ethnic % of All Applicants	4 Number Admitted	5 Ethnic % of All Admitted	6 Admitted % Ethnic Applicants	7 Estimated Mean of Applicants	8 Estimated Mean of Admitted
Am. Indian	669	0.8%	382	0.7%	57.1%	149.1	153.7
Black	9,592	11.1%	3,943	7.7%	41.1%	142.4	148.4
Chicano	1,507	1.7%	803	1.6%	53.3%	148.4	153.4
Hispanic	2,898	3.4%	1,545	3.0%	53.3%	148.0	152.8
P. Rican	1,706	2.0%	652	1.3%	38.2%	140.2	147.8
Asian/P.I.	5,305	6.2%	3,221	6.3%	60.7%	152.2	156.3
White	61,689	71.6%	39,382	76.5%	63.8%	154.0	157.3
Other	2,222	2.6%	1,264	2.5%	56.9%	151.0	155.7
All	86, 192	100.0%	51,485	100.0%	59.7%	151.9	156.2

LSAS reported a mean of 152.4 for over 87,000 applicants in 1993-94 who took this version of the LSAT (LSAS, 1995). The estimated mean of applicants and admitted in this table were calculated from ranges given in the 1993-94 National Decision Profiles. The standard deviation is estimated at 8 for applicants and 7 for admittees.

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Table 6. Applicants & Admittees, White to Black Ratios, 1993-94

LSAT Ranges	APPLICANTS Number Whites	Number Blacks	W-B Ratios	LSAT Ranges	ADMITTEES Number Whites	Number Blacks	W-B Ratios
175-180	415	3	138.3 : 1	175-180	394	3	131.3 : 1
170-174	1,764	14	126.0 : 1	170-174	1,660	14	118.6 : 1
165-169	5,244	80	65.6 : 1	165-169	4,797	76	63.1 : 1
160-164	9,623	203	47.4 : 1	160-164	8,447	185	45.7 : 1
155-159	13,789	590	23.8 : 1	155-159	11,086	528	21.0 : 1
150-154	14,059	1,148	12.2 : 1	150-154	8,720	934	9.3 : 1
145-149	9,767	1,803	5.4 : 1	145-149	3,308	1,116	3.0 : 1
140-144	4,911	2,336	2.1 : 1	140-144	817	791	1.0 : 1
135-139	1,588	1,917	0.8 : 1	135-139	129	252	0.5 : 1
130-134	415	1.050	0.4 : 1	130-134	24	38	0.6 : 1
125-129	95	358	0.3 : 1	125-129	0	4	0.0 : 1
120-124	19	90	0.2 : 1	120-124	0	2	0.0 : 1
Totals	61,689	9,592	6.4 : 1	Totals	39,382	3,943	10 : 1
U.S. Pop.	185 MM	34 MM	5.4 : 1	U.S. Pop.	185 MM	34 MM	5.4 : 1

Population data based on 260 million Americans, 71% white, 13% black.

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Table 7. Applicants & Admittees, White to Asian/Pacific Isl. Ratios, 1993-94

LSAT	APPLICANTS		W-B	LSAT	ADMITTEES		W-B
Ranges	Number Whites	Number Asian/P.I.	Ratios	Ranges	Number Whites	Number Asian/P.I.	Ratios
175-180	415	24	17.3 : 1	175-180	394	23	17.1 : 1
170-174	1,764	155	11.4 : 1	170-174	1,660	142	11.7 : 1
165-169	5,244	423	12.4 : 1	165-169	4,797	385	12.5 : 1
160-164	9,623	748	12.9 : 1	160-164	8,447	619	13.6 : 1
155-159	13,789	965	14.3 : 1	155-159	11,086	765	14.5 : 1
150-154	14,059	1,047	13.4 : 1	150-154	8,720	717	12.2 : 1
145-149	9,767	878	11.1 : 1	145-149	3,308	406	8.1 : 1
140-144	4,911	610	8.1 : 1	140-144	817	126	6.5 : 1
135-139	1,588	289	5.5 : 1	135-139	129	35	3.7 : 1
130-134	415	124	3.3 : 1	130-134	24	3	8.0 : 1
125-129	95	30	3.2 : 1	125-129	0	0	-
120-124	18	12	1.5 : 1	120-124	0	0	-
Totals	61,689	5,305	11.6 : 1	Totals	39,382	3,221	12.2 : 1
U.S. Pop.	185 MM	10.4 MM	17.8 : 1	U.S. Pop.	185 MM	10.4 MM	17.8 : 1

Population data based on 260 million Americans, 71% white, 4% Asian/Pacific Islander.

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Table 8. 1993-94 Admittees If LSAT Only Criteria

1 Ethnic Group	2 LSAT Only	3 Number Admitted	4 Current Criteria	5 Number Admitted	6 Diffence Numbers	7 Difference Percent
Am. Indian	51.9%	342	57.1%	382	-40	-10.5%
Black	21.5%	2,065	41.1%	3,943	-1,878	-47.6%
Chicano	44.9%	676	53.3%	803	-127	-15.9%
Hispanic	44.6%	1,293	53.3%	1,545	-252	-16.3%
Puerto Rican	20.4%	347	38.2%	652	-305	-46.7%
Asian/P.I.	63.4%	3,363	60.7%	3,221	+142	+4.4%
White	72.7%	44,919	63.8%	39,382	+5,537	+14.1%
Other	57.9%	1287	56.9%	1,264	+23	+1.8%
Total	-	54,307	0.56	51,192	+3,116	+6.1%

Number Applicants per Group Scoring 150 or Above on the LSAT, 1993-94

Range	Am. Indian	Black	Chicano	Hispanic	P. Rican	Asian	White	Other
150-154	21.8%	12.0%	17.6%	19.9%	9.3%	19.7%	22.8%	18.9%
155-159	18.2%	6.2%	16.2%	13.0%	6.7%	18.2%	22.4%	16.3%
160-164	8.5%	2.1%	7.2%	7.3%	2.7%	14.1%	1.6%	12.3%
165-169	3.6%	0.8%	2.9%	3.2%	1.4%	8.0%	8.5%	7.6%
170-174	1.2%	0.2%	0.9%	1.1%	0.2%	2.9%	2.9%	2.2%
175-179	0.2%	0.3%	0.1%	0.1%	0.1%	0.5%	0.7%	0.7%
Total	51.9%	21.5%	44.9%	44.6%	20.4%	63.4%	72.7%	57.9%

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but still below the white average. For admissions, the standard deviation gap from the white mean is: Asian/Pacific Islander -0.14,Other -0.23, American Indian -0.51, Chicano -0.56, Hispanic -0.64, black -1.27, Puerto Rican -1.35. The variance between groups has declined slightly.

Column 6 shows that whites, with the highest admissions mean, now have the highest proportion of admitted applicants; the group with the next highest mean has the next highest admission rate, etc. The percentage admitted for each group corresponds somewhat with the mean of those admitted. The pattern still indicates discrimination, although somewhat lessened, against whites and a distinct preference for the protected class minorities. Asian/Pacific Islander admissions seem to be fair; i.e., the mean and percent admitted are virtually the same as for All admissions.

White-Black Comparison

A controversial but widely discussed topic is the average IQ differences between whites and blacks. These are the two largest American ethnic groups and their performance on the LSAT is similar to that on IQ tests, varying dramatically with each group on opposite ends of the scale.

Table 6 compares the LSAT scores of white and black applicants and admittees to determine ratios of performance at different levels (ranges) of LSAT scores. The bottom row shows that in 1993 the approximate ratio of whites to blacks in the American population[14] was about 5.4 : 1, the ratio of those who apply to law school was 6.4 : 1, and the ratio of those who are admitted was 10 : 1. The black admission ratio into law school is only about half of their population ratio. Someone superficially reading those numbers might conclude that a pattern of discrimination existed against blacks.

The performance ratios within each LSAT range tell a different tale. In 1993-94, 415 whites and 3 blacks, who applied to law schools,

[14] A more relevant ratio might be whites and blacks within the age group of 20-30, the ages in which most people interested in pursuing a legal career are likely to take the LSAT and apply to law school. A guess is that this ratio might be 5 : 1 or lower since the average age for blacks is lower than for whites.

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scored in the very top range of 175-180; see the top row. Law schools admitted 394 of the whites (94.9% of those applicants) and all 3 blacks.[15] As Table 6 shows, the white-black ratio for admissions is 131.3 : 1, over 24 times the population ratio. Indicating a strong correlation between race and LSAT score, the ratio of white to black increases as scores increase; the higher the score the higher the ratio. The estimated mean LSAT score for All applicants in 1993-94 was 156.2 (from Table 5). In the relevant 155-159 range, the white-black ratio was 21.0 : 1, about four times the population ratio. In the lowest ranges, a few blacks are admitted to law school, but whites are not.

For black applicants, there was about a nine percent overlap compared to whites; 9.28% scored above the white applicant mean. Approximately 10-12% of blacks[16] admitted score above the white admissions mean. At elite law schools the situation is even more extreme: "At ten highly selective law schools for which individual data were reported in a 1977 report by the Law School Admissions Council, the smallest black-white difference in LSAT scores (expressed in terms of white distribution) at any of the ten schools was 2.4 standard deviations, the largest was 3.6 standard deviations, and the average difference for the ten schools was 2.9 standard deviations, meaning that the average black was in the bottom 1% of the white distribution" (Herrnstein and Murray, 1994, p. 456). In this study, the most blacks admitted to all law schools will fall in the bottom 10% of the white distribution. Part of the reason for this is that the black curve is skewed right and the mode is to the left of the mean; see Fig. C, which illustrates the data in Table 6.

Several conclusions might be drawn from this analysis: (1) Blacks

[15] Was GPA a factor? The three blacks had GPAs of 3.5-3.74, 3.25-3.49, and 2.75-2.99. Three "rejected" whites had GPAs of 3.75 and above, and five had 3.5-3.74, better or equivalent to the top scoring black. Twelve of the 19 "rejected" whites had GPAs equal to or higher that the black with the lowest GPA. Factors other than GPA seem to have been decisive.

[16] The LSAS data is reported in ranges of scores. The 50 percentile cutoff for white admissions fell within the 155-159 range and required an estimation of the actual overlap. For applicants, the 50 percentile cutoff for whites happened to fall between two ranges, 150-154 and 155-159; 50.02% of whites scored below 155 and 49.98% scored above 154.

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are not as well represented in law school admissions as they are in the general population. (2) Their poor showing on the LSAT is one reason for that under representation. (3) If the LSAT was the sole criterion, blacks would be over represented in law school admissions. (4) Law schools weight other factors higher than the LSAT for blacks in their admissions decision making.

White-Asian/Pacific Islander Comparison

Of interest recently is the performance of Asian-Americans on IQ and various scholastic aptitude tests: they sometimes score better on average than whites (Herrnstein and Murray, pp. 272-276, 455, 456, 458). On the LSAT, however, they score a little lower on average than whites. To look at this situation more closely, Table 7 compares whites to Asian/Pacific Islanders as Table 6 compared whites to blacks. As the last two rows indicate, Asian/Pacific Islanders apply and are accepted at higher ratios than their ratio of the American population. For every Asian/Pacific Islander, there are 17.8 white people in the U.S;2 however, for every Asian/Pacific Islander applying to law school there are only 11.6 whites applying and for every one admitted there are 12.2 whites admitted. Asian/Pacific Islanders are more highly represented both in applications and in admissions than they are in the general population. The pattern of scores shows that at the very top (175-180) whites and Asian/Pacific Islanders score according to their population ratio. In the next five or six lower ranges, each group scores according to the application and admission ratios; there is a slight advantage to whites. After that, in the lower ranges, the advantage goes clearly to the white applicants and admittees. The over representation may indicate that ethnic group members recognize and are taking advantage of affirmative action opportunities, drawing less qualified applicants into the process and in turn lowering the group average. However, that is simple speculation and is contradicted by the 1990-91 profiles. In that report, fewer Asian/Pacific Islanders and more whites applied and were admitted and the performance ratios were about the same.

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Ceteris Paribus

A simple test for preferential admissions might be to apply the rule of *ceteris paribus*, hold everything else constant. What if law schools used an LSAT score of 150 or better as the only factor in the first round of screening for law school admission? In the 1993-94 cohort, 58% of All applicants and 71% of All admitted scored 150 or above. In this scenario, anyone who passed that barrier could then apply to various law schools to be judged by LSAT range, GPAs, state of residency, race, ethnicity, gender, personal interviews, written essays, letters of recommendation, felony convictions, etc. What percentage of each group would pass the first hurdle? Table 8 gives the answer and may also indicate to a certain extent how much racial and ethnic preferences are influencing admissions.

In Table 8 there are two sets of data. The bottom set shows the percentage of each group that scored in the six relevant LSAT ranges. For instance, 20.2% of American Indians placed in the 150-154 range; 18.2% in the 155-159 range, etc., for a total of 51.9% scoring 150 and above. That total for American Indians is then carried over to column 2, labeled "LSAT Only," in the top set of data and used to calculate the estimated number that would have been given a chance for admission under the *ceteris paribus* rule.

The top set contains the comparisons sought. Column 2 can be compared to column 4, which shows the actual percent admitted (57.1%) in 1993-94 by law schools using LSAT, GPA, and other subjective criteria. Column 3 shows that with the "LSAT Only" criterion, 358 American Indians would be admitted compared to the 382 actually admitted and shown in column 5. Column 6 shows the difference in number (at least 40 fewer admitted) and column 7 shows the difference in percentage (-10.5%). The number of blacks given opportunities, despite their low performance on the LSAT, is even greater; 1,878 would not have made the cut. On the other hand, 5,537 whites who scored 150 or better were not given an opportunity, at least that year.

Numbers, People, and Double Standards

This paper has dealt with numbers, data, statistics. However, the

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men and women sitting on law school admissions boards deal with people, mostly young and ambitious undergraduate students. They apply obviously different standards, depending on the race or ethnicity of the applicants, and make decisions affecting those people's lives. They determine who will be given a chance and who won't. The people they reject, they never see.

Column 6 in Table 8 provides some indication of the numbers of people affected, both positively and negatively, by race norming admissions at law schools. Every year thousands who seek entry and are rejected must swallow their disappointment, reevaluate their career goals, look into different opportunities, and perhaps redirect their lives. Many never realize that they had better LSAT scores (and probably better GPAs) than thousands of others who "succeeded."

But, of course, it doesn't end there. Preferential policies are a much larger problem that race norming at law schools. How many other people, seeking entry into graduate schools, doctoral programs, medical schools, selective undergraduate universities, or just seeking employment in government or private enterprise, are impacted? The numbers are in the tens of thousands each year, accumulating into the hundreds of thousands as the years pass. After decades of preferential policies, is there an end in sight for double standards? The people who cheered civil rights laws 30 years ago now see their own children discriminated against. What will their grandchildren experience? What legacy is America leaving future generations?

Developing uniform and fair standards in increasingly multi-cultural, multi-ethnic, and multi-racial societies like the United States is and will continue to be a difficult challenge. Many Western European nations, although their situations are not as far advanced as in the U.S., also have rapidly changing demographics and face the same challenge. If recent American history is any indicator, under represented groups in those countries will demand "fairness" through proportional representation in education, jobs, etc. The majority group, as has happened in the U.S., will probably sacrifice the careers and ambitions of some of its members to meet those demands.

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Intelligence and National Achievement

Editor

Raymond B. Cattell

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Men, Women and Sex Differences: The Attitudes of Three Feminists – Gloria Steinem, Gloria Allred and Bella Abzug

Russell Eisenman
McNeese State University

A case study of how three prominent feminists responded to evidence of sex differences is presented. Interesting research on sex differences is discussed, including brain differences. Much of it is from the ABC-TV program "Boys and Girls Are Different" hosted by John Stossel. The response of feminists Gloria Steinem, Gloria Allred, and Bella Abzug would seem to fit Festinger's concept of cognitive dissonance, whereby the unpleasant effect of multiple ideas contradicting each other induces persons to rationalize the one away to preserve existing and established sets of beliefs.

This paper is a case study of how three prominent feminists responded to the cognitive dissonance induced by ideas about sex differences. Festinger (1957) developed a theory of cognitive dissonance. He says that when we have two ideas that we see as inconsistent with one another we develop a state of cognitive dissonance, which we find unpleasant. We thus try to achieve consonance. But, the consonance is often achieved by rationalizing away one of the threatening ideas. For example, the idea that (1) I smoke, and (2) smoking is dangerous, should produce cognitive dissonance. Most people in this situation would rationalize away so that they could continue to smoke, now no longer seeing smoking as dangerous, despite evidence on the dangers of smoking. For the three feminists, the cognitive dissonance would occur between the ideas that (1) they think males and females are the same (and thus there should be no discrimination against females) and (2) research shows sex differences between males and females. From Festinger's work,

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we can predict that the tendency will be not to alter their political, ideological beliefs (belief 1), but to rationalize away the findings (idea number 2), just as smokers continue to smoke and rationalize away evidence on the dangers of smoking.

There is much interesting research occurring on sex differences between males and females. Some of it was summarized on the American Broadcasting Company television program, "Boy and Girls Are Different: Men, Women, and the Sex Difference," that aired on February 1, 1995, and was hosted by John Stossel. That research will be discussed here. Of at least equal interest is the response of the three feminists on that program: Gloria Steinem, Gloria Allred, and Bella Abzug. According to Stossel, Steinem believed that research on sex differences should not be done, and Allred believed that a program on sex differences should not be aired. While these views seem anti-research and anti-science, they are not as infrequent as one might hope.

The program also pointed out that some people who try to get grants to study sex differences have been refused funding because the topic is not politically acceptable. Thus, the political views of Steinem and Allred (and Abzug's view that findings reporting sex differences are "poppycock") have support in the real world. One of the women who does research on sex differences was advised by colleagues to avoid the area, due to its being politically incorrect.

There Are Different Feminist Views

The views of the three feminists presented here do not represent all of feminism. As Sommers (1994) pointed out, groups of zealots have taken over much of the feminist movement. Those she calls "gender feminists" seem anti-male and want to portray women as helpless victims of men. Men are the enemy, in this ideology. Further, Sommers says that research findings are misused to support the gender feminists' ideology. The present report is an example of that, in that the three feminists on the program deny valid research on sex differences in order to maintain their ideological belief that there are no sex differences. The research is "misused" in the sense that it is denied. But, as Sommers (1994) mentioned, there are other feminists

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who want women to have rights, but who do not denigrate men or use research in a dishonest or misleading fashion. She calls these "equity feminists."

In my book *Readings in Psychology* (Eisenman, 1995b) I published four articles critical of feminism. My criticisms stem from the kind of feminists Sommers (1994) condemns, who seem to be the ones with the most power. Since they are the ones fashioning laws and public opinion, they have come in for criticism from me and others (see, for example, good critiques by Levin, 1987 and Farrell, 1994). But it should be noted that other feminists, those whom Sommers (1994) calls "equity feminists," do not seem out to get men or misuse research. The ideals of the original feminist movement – equal opportunities for women, freedom from discrimination, etc. – still make sense today.

Eagly on Feminism and Sex Differences

The March 1995 issue of the *American Psychologist* contained an article by Alice Eagly (1995a) that pointed out that recent studies have shown that the assumption that research on sex differences yields only small differences is false. She says that the more recent empirical studies show large sex differences. Many feminists feel such findings of real sex differences weakens their arguments for women's rights. There were three articles in response to Eagly.

Hyde and Plant (1995) state that there is not a single feminist position on sex differences, and that some feminists argue for large sex differences. Marecek (1995) disputed Eagly (1995), saying that feminist theories show that alleged sex differences are often a reflection of interpersonal and institutional realities. Buss (1995) was the only person clearly in support of Eagly, stating that from an evolutionary standpoint there are large sex differences. In her response to the comments, Eagly (1995b) further supported her position and noted that many feminists want no differences found between men and women, in order to support efforts toward equality of treatment.

Hare-Mustin and Marecek (1988) have perhaps best summarized the politically-inspired nature of views on sex differences. They say

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that there are contrasting biases, with some exaggerating sex differences and others minimizing them. The task, then, for any honest person should be to obtain a correct view, without trying to overemphasize or underemphasize gender differences.

The Relevance of Scientific Research

The emphasis on political correctness rather than scientific validity is an anti-intellectual position. Research helps us understand the world better. Although any one study may be flawed, other research often serves as a corrective, pointing out what was wrong with the earlier work. Science is incremental. One study or several studies may not provide important answers, but as time goes on the addition of many new studies often shows the correct way, dealing with any flaws in the execution or conceptualization of the earlier work. People who do not understand this often think that an individual study is worthless, since it seems to have so many possible alternative explanations. But the individual study contributes to our overall knowledge in an area, and as more studies are done that individual study, seen in the context of the other studies, may be very valuable. To oppose research because it does not fit with one's political views is anti-intellectual. It is also quite possibly short-sighted, as the research may help to show how things are, and thus actually help people in living better lives. Of course, if one is totally opposed to, say, any view that there may be differences between the sexes, or if one feels that any research on sex differences will be used to put down women, then one would, on political grounds, be inclined toward opposition to such research.

Research has shown a relationship between political beliefs and prejudice (Altmeyer, 1988; Eisenman, 1991; Kinder & Sears, 1985; Sears, Lau, Tyler, & Allen, 1980; Sniderman, Brody, & Tetlock, 1991; Sniderman & Hagen, 1985). Thus, one's political beliefs may be consistent with or used to support one's prejudice. Ideology is not always objective. People may embrace a viewpoint that represents a political ideology without even realizing it, since the belief may seem attractive, being allegedly based on "equality," "fairness," or other terms which seem reasonable, but which disguise a political ideology

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(Eisenman, 1995a).

Sex Differences in "Boys and Girls Are Different"

Perhaps one of the most interesting sex differences shown on "Boys and Girls Are Different" was research by Michael Lewis with one-year old boys and girls. He had a barrier put up, such that the child was separated from its mother. The child could see the mother, but was prevented from reaching her. Most boys tried to knock down the barrier, but most girls just stood there and cried.

This finding is consistent with the view of greater aggression or assertion in men, and greater passivity in women. Since the children were only one year old, the results would seem more consistent with a biological explanation than with a socialization explanation, although socialization cannot be entirely ruled out since there was time (one year) for stereotyped sex differences to be imposed.

However, it may be that boys and girls have different ways of adapting to their worlds. This difference could explain why, throughout history, men have tended to obtain political power and to come up with the creative inventions, while women have not often done so. Women's strength may lie more in dealing with people and things in a less aggressive fashion, which could be very valuable in interactions with people or in raising a child. Thus, both the male and female tendencies, if such there are, have value. But to maintain that there is no difference between the sexes, one would have to denigrate any research that shows sex differences. This, of course, is what Steinem, Allred, and Abzug all did.

Another interesting sex difference study was done at the University of Rochester, and showed, according to Stossel, that due to brain differences, men and women navigate differently. Students were blindfolded and walked through a maze of tunnels underneath the campus. Men were quite accurate in maintaining a sense of direction, but women were not. This is consistent with research showing that people with higher masculinity scores tend to do better on visual-spatial tests (and in mathematics) than those who score higher on femininity (Signorella & Jamison, 1986). One can see that some women, or perhaps especially some feminists, would be upset

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if studies of sex differences constantly seem to favor the men over the women in some skill. But the next study is just the opposite, a study in which the women outperformed the men.

At York University in Canada, male and female students were left alone in a room to await a study. Actually, waiting in the room was part of the study, for when they sat down with the experimenter in another room the students were asked to recall what was in the room. A typical female response (all quotes are from the transcript of the program, which I purchased from Journal Graphics): "On the right-hand side of the desk, right here, was a briefcase with your initials at the top. There was a tube with mitts and a 'I am 40' button on it. In the middle there were envelopes, York University envelopes. There was a thing of Clearisil and a Bazooka joke comic." This was only part of her response, but was all that was shown on the television program. Stossel said "We could let her go on much longer." Contrast that impressive memory performance with that of a typical male student: "I remember Pound Puppies. It was like, right here. I don't have a very good memory, I don't." That is it. The women remembered the room while the men tended not to remember. Since the subjects were not told that they would be quizzed on what was in the room, the memory may have something to do with recalling incidental things, or perhaps it is just general memory ability. In any case, the women far outpaced the men.

Stossel suggested that the brains of men and women may be different, accounting for these and other sex differences. Research with animals supports this view, with emphasis on different hormones produced by male and female brains. For example, Stossel pointed out that at the University of California at Los Angeles, Roger Gorsky found that when female rats were injected with the male hormone testosterone they behaved like males. Both men and women have some of the so-called other sex hormone: men have small amounts of estrogen; women have small amounts of testosterone. But, the differences are so great that it is perhaps valid to speak of testosterone as the male hormone and estrogen as the female hormone.

Stossel further points to research on monkeys at the University

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of Wisconsin, wherein female monkeys were injected with testosterone and grew up to behave like male monkeys, fighting but not grooming. In both the above-mentioned rat study and in this monkey study, the television program showed the male-like behavior of the testosterone injected females.

Failure to Consider Sex Differences: Haircuts

Possibly inspired by feminist rhetoric, attorneys have sued to make hair salons and others who cut hair charge the same amount for men's and women's haircuts. A television program on the subject showed stores that were charging the two sexes different amounts. The attorneys won their suit by arguing that this constituted was illegal discrimination, and likened it to the idea of charging more to cut the hair of black people than that of white people.

But, as Stossel showed via interviews, people who work in these salons say that it is much more work to cut women's hair. Women typically have more hair and it takes longer to do. Also, women are more critical, say the hair cutters, which again makes cutting their hair a more difficult task. When Stossel tried to discuss this with Gloria Allred, she was adamant that law suits would be used to enforce the absence of different treatment of men and women. She came across as angry and insensitive.

My daughter, Susan, has a perspective on this hair-splitting issue that seems to make sense. She resents being charged more, since she has relatively short hair. She says that the charge should be based on the amount of work required. Thus, most women would pay more, but women with short hair would pay less. Men with long hair would pay more. This would seem to be a fairer standard, given that there are often differences in hair length. But we may doubt that any of the three feminists interviewed on the television program would accept such a position. They seem to have a political agenda of getting more things for women, and denying any sex differences, that would lead them to side with the above mentioned attorneys and reject all other views.

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According to June Reinisch:

John Stossel cited a list prepared by June Reinisch, head of the Kinsey Institute at Indiana University, documenting early behavioral differences in infants. such as the fact that girls sit up without support earlier than boys do. However, boys crawl away from their caretaker earlier than girls. Male infants startle more readily than female infants. Female infants rhythmically mouth more than male infants; that is, they suck on their tongues, move their lips, etc. She added "Men and women are not the same."

While it is not clear what all this means (males do some things more than females, and vice versa) the findings cited by Reinisch do suggest, as Stossel said, "So, could it be that when we treat kids differently, cuddle the girls, toss the boys into the air, that we're not just being sexist? Maybe we're responding to the inborn cues from the kids."

Stossel then went on to say that if there is an in-born difference between boys and girls, it should show up in the brains, and cited the work of Laura Allen, who has been studying brain tissue of the two sexes at the University of California at Los Angeles. He quoted her as saying that: "As I began to look at the human brain more and more, I kept finding differences, and about 7 or 8 out of the 10 structures that we actually measured turned out to be different between men and women."

Toy Companies: Reality from the Marketplace

Toy companies have an incentive to do whatever will sell. They are large corporations, out to make money. Gloria Steinem complained of parents inducing sex differences and said "We badly need to raise our boys more like our girls." Bella Abzug was asked by Stossel, "If society weren't sexist, the kids would do roughly the same? The boys would nurture the dolls?" Abzug said "I think so. I think it would be very much more interchangeable." Stossel then asked, "What about those who say there are biological differences" and Abzug said, "Well, I think that's a lot of poppycock."

The findings of toy companies is that even when they try to get children to buy the toys preferred by the opposite sex, they do not

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succeed. They would make a lot of money if toys were popular with both sexes, instead of toy *A* appealing to boys and toy *B* appealing to girls. But, their efforts to market toys to both sexes have not been effective. The consumers, the boys and the girls, want different toys. *Advertising Age* columnist Kate Fitzgerald said "What you see on the shelves is the reality of what has worked. Girls tend to want dolls, girls want pink, girls are more concerned with the relationships between the characters. Girls want to talk and play and be together. The toy companies have lost millions of dollars in testing and manufacturing toys that they thought would win over the opposite gender. They only respond to what kids want."

Biology as an Explanation as Opposed to Social Learning

The description of girls' preferences by Fitzgerald fits with sex differences alleged by Wilson (1992) in his sociobiological theory to be evolutionary. He says that females tend to be higher than males in empathy, verbal skills, social skills and security-seeking, among other things, while men tend to be higher in independence, dominance, spatial and mathematical skills, rank-related aggression, and other characteristics. So from this perspective it would make sense that girls would want a doll family, and to play with them as though they were interacting with each other, while boys would prefer soldiers, who fight to see who will come out on top. Not only do these choices fit with alleged biological predispositions, but they also prepare children for their future roles in society. Feminists, taking a social learning perspective, have often argued that such societal roles are due to what children are taught. Wilson (1992) and others of a biological orientation would argue that such societal roles are the normal outcome of innate biological differences between males and females. Wilson's small book is filled with evidence to support his biological model of sex differences and to refute the social learning model.

Since most people have not heard of the biological view, and have been exposed, at most, to a social learning explanation, Wilson's (1992) book is recommended as an antidote to a limited way of looking at sex differences. Of course, a strictly biological view that

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fails to consider the way society influences behavior would also be limited.

Funny and Sad:
Why Gloria Steinem Endorses Female Firefighters

Part of the program "Boys and Girls Are Different" dealt with the efforts to have equality in hiring, such that hiring rules that limit a job mostly to one sex cannot be used. For example, many fire fighter jobs require some exhibition of physical abilities, such as chopping wood, climbing over a wall, and carrying a fire hose, before one can be hired. But since women tend to do worse than men on these tasks, there is a move to prevent fire companies from using these tasks for hiring purposes. One female fire fighter who was strong enough to pass the tests said she did not want to work with women who could not pass them, as they would be a hazard to her and the other firefighters, as well as to the people they are trying to save.

Gloria Steinem, like many feminists and others who believe in mandated equality (not just equal opportunity; see Eisenman, 1995a), wants women to be hired just as much as men, and thus objects to any pre-employment screening that results in most women not passing. When confronted with the argument that many women are not strong enough to carry injured people out of a burning building, she gave a response which was both funny and sad. It was suggested that such women could only drag injured or unconscious people down the stairs, pulling them by their ankles, which could lead to head injuries, as Cato Burn, a scholar at the Heritage Foundation, pointed out. However, Steinem, trying to defend the hiring of female firefighters, said, "It's better to drag them out, because there is less smoke down there. I mean, we're probably killing people by carrying them out at that height, you know, so – I mean, you know, we need to look sensibly here at these jobs and what they really require, and not just some idea of what macho is." Some of my students laughed when she said that. It seemed like an obvious rationalization to defend her viewpoint, even when there is an argument that defeats it.

This rationalizing would be consistent with Festinger's (1957)

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view that when we are presented with two views, dissonance is introduced, which is uncomfortable. People try to achieve consonance by rationalizing away one of the views. Thus, a smoker has cognitive dissonance from the views (1) I smoke and (2) smoking is dangerous. The most rational response would be to stop smoking, but people are more likely to rationalize away the dangers of smoking. Thus, they can still smoke, but without the cognitive dissonance of thinking that smoking is dangerous.

Two Kinds of Discrimination

Steinem wants women hired as firefighters, and when evidence suggests that the discrimination in hiring may be valid, she comes up with a rather bizarre argument about how it is better not to lift up people when carrying them out of a burning building. An important point is that discrimination is not necessarily bad. We have heard the word "discrimination" used so often in civil rights cases in a negative way, that we may fail to see its other usage as a positive thing, as when a test validly discriminates between who can do the work and who cannot. This is the good kind of discrimination, on a par with saying that a wine connoisseur has a discriminating taste for wines.

The EEOC Lawsuit Against Sears

The idea that any discrimination is bad has led to harmful results. For example, Stossel pointed out the case of Sears and the lawsuit against them by the Equal Employment Opportunity Commission. "Been to Sears lately?" asked Stossel. He said, "If you buy something here [at Sears] you should know that some of your dollar goes to pay for years of litigation between Sears and the Equal Employment Opportunity Commission.

The EEOC apparently found out that more male than female sales clerks at Sears earn big commissions, apparently due to more men than women working in such departments as lawnmowers and appliances. The EEOC took the evidence of different sales figures, and different sexes tending to work in different departments, as evidence that Sears discriminated against women. The lawsuit lasted for years and cost $20 million, according to Stossel. Sears said, in

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effect, (quoting Stossel) "We didn't discriminate. We asked women to do all those jobs. It's just that few women want to sell things like lawnmowers." According to Stossel, "After the EEOC was unable to produce any women who said they'd been discriminated against, Sears won the suit. The $20 million the litigation cost will be passed on to us customers."

Sports and "Discrimination"

This reminds me of an event that happened several months after the program. A federal judge held that Brown University is guilty of sex discrimination because, even though it provides an equal number of intercollegiate athletic programs for male and female students, there are fewer women in the female sports programs. Thus, Brown was found to be discriminating on the basis of Title IX, that says that universities may not discriminate on the basis of sex. Many universities are having a problem with Title IX, since more men then women are typically interested in playing collegiate sports, more fans are interested in the male sports, and, especially because of football, more money is thus spent on the male sports. Also, it is typically only some of the male sports that produce revenue for the school (although the high costs of such sports as football or basketball means that few sports really wind up making money, if the costs are taken into account, except in the instances of big-time athletic programs that receive large donations from alumni).

I have heard horror stories of how women's sports used to be the step sister, receiving little in the way of support, relative to the men's sports. For example, while one university's men's basketball team got to stay at nice hotels, the women's basketball team had to stay at cheaper motels and sleep two to a bed. The university did not give them enough money for each women basketball player to have her own bed. Such things need correction. But, to say that everything has to be equal is to go against both the reality of how much men value competitive sports as opposed to women, and how little fan interest there is in women's sports. Perhaps men like to participate in competitive collegiate sports because they are responding to their greater physical strength, which makes them more interested in using

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that strength in a sport, and also due to the alleged male need for dominance and rank (Wilson, 1992). The nature of most sports would seem less consistent with the observed female interests in such things as interpersonal communication, taking care of children, or verbal skills, to name a few. All of those things are of limited use in the fast action of most competitive collegiate sports. Communication is obviously needed in sport, but the kind of deep interpersonal communication favored by women is not what is needed, but rather something to help you quickly establish dominance over an opponent.

Who Gets Custody of the Child?

An interesting point emerged when Stossel mentioned that perhaps, over the centuries, women have shown more interest in child rearing than have men. This would be the view of Helen Fisher, an anthropologist, who believes that sex differences evolved over millions of years, as men and women did different things, and thus the successful men and women who survived passed on genes for different kinds of behaviors. For example, women are less likely to abandon their child than are men. Perhaps this is another sex difference, and consistent with the early woman caring for the child while the man was out hunting, and also consistent with the tendency of courts to award child custody to the wife and not the husband.

However, when Stossel interviewed men's rights activists on the issue of who the courts tend to give the child to, the roles were reversed, with the men's rights activists sounding like the three feminists, and arguing against sex differences. Consider the following exchange between Stossel and two men's rights activists, Richard Bogash and Sidney Siller:

> Stossel: Aren't women better mothers, better nurturers?
> Bogash: Fathers and mothers are both equally good parents.
> Stossel: Evolution shows that women have done most of the mothering?
> Siller: That is not – that is not – that is a myth. That is a myth.

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Hostility or Ignorance of Research

When some people wish to speak from a political position regarding the rights of their gender, it seems convenient to overlook or denigrate research, if it leads to conclusions not consistent with one's bias. This is, however, a very anti-intellectual way to think. But apparently some feminists such as Steinem, Allred, and Abzug are so imbedded into their ideology that they will not entertain any research findings that do not support what they already believe.

Another possibility is that they are either ignorant of research methods in general, or are simply ignorant of the specific research that is done on sex differences. Perhaps these feminists, and others devoted to equality, have no real sense of how the scientific method operates to help us understand our world. But they do have a political ideology. Lacking any real understanding of how hypotheses are tested, and supported or not supported, how research is incremental and builds on past research, etc., such people ignore research, except when they hear of findings that support what they already believe. They would never concede that perhaps a biological explanation is superior to a social-learning explanation to account for something that they had conceptualized as being environmentally caused.

How the Feminists Came Across on the TV Show

The three feminists came across badly on the television program. Largely, this was due to their views: their refusal to accept research. However, part of it could have been due to how they were presented. Gloria Allred seemed constantly angry, and her desire to have constant lawsuits seemed absurd. But, television programs can often make you look how they want. Perhaps some of her anger was due to topics discussed but not the specific ones shown. Some of her advocacy of lawsuits may have been a general point, not specific to what was being discussed. For example, to show that a lawsuit seems absurd in a specific instance, and then to interview Allred about lawsuits and have her speaking in favor of them, makes it seem like she advocates a lawsuit in the absurd case. I got the feeling this was being done to her, due to the way the program was edited, which

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showed certain things, and then had a general statement from her, in response to a general question from Stossel.

If I am correct, then she was treated unfairly, and made to appear to communicate things she was not really communicating. In defense of the program, Allred is an attorney and seems to be very much in favor of lawsuits. Like Steinem and Abzug, she also favors the view that men and women are the same, and considers any evidence to the contrary to be misleading and harmful. As I mentioned at the beginning, according to Stossel, Steinem argued that no research should be conducted into sex differences, and Allred believed that such research as had been conducted should not be publicized on TV.

Steinem came across as a rigid person who would not consider any idea inconsistent with her ideology. Her defense of female fire fighters who are not able to carry out victims was a telling point. Although not as overtly angry as Allred, she seemed sarcastic at times, as when she told Stossel she could smell sexism better than he could, in response to his saying that research showed that women have a better sense of smell than men. This might have appealed to those who support her, but it failed to deal with Stossel's point, and just put him down and avoided the issue.

Abzug seemed like a pleasant person, but one totally ignorant of research on sex differences, and perhaps ignorant of research in general. Of course, most people know little or nothing about research, but when one is in the public policy arena, there is some obligation to understand relevant findings and not be close-minded about them.

One problem for feminism, besides the specific content of their ideology, has been that nonfeminists perceive them as not very appealing people. Feminists are fond of saying that the media portray them as hairy-armed, unattractive women (Wolf, 1993). But there is also the accurate negative perception if one comes across rigid and sarcastic (Steinem on the program) or constantly angry (Allred on the program).

There are feminists who do research, as well as those who follow the research literature. The picture of anti-research bias presented

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above is either (a) a function of the three specific feminists studied or (b) the stance they took when the research went against their beliefs. Perhaps they know a little research, and selectively report it to further their goals.

Further Thoughts

Do the brains of males and females really differ, resulting in very different behavior? A very readable book on the biology of sex differences is that of Moir and Jessel (1991), who record the observed brain differences. A more cautious approach is presented by Springer and Deutsch (1994). A useful discussion of psychological perspectives on gender can be found in Brannon (1995), a feminist who emphasizes social influence more than biological causes.

Steinem (1986) has published a very readable memoir of her involvement in the feminist movement. On the back cover of the paperback edition, actor Alan Alda is quoted as saying, "Her book is like the woman herself: intelligent, concerned, articulate, precise, and never without a sense of balance." However, this is not the way I felt she or the other two feminists came across on the television program "Boys and Girls Are Different." It would be interesting to understand why.

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Intellectual Ability, Evolution and Eugenics

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In my article entitled "Biological Diversity and Ethnic Identity: Changing Patterns in the Modern World," which appeared in the Winter 1995 issue of this journal, I observed that evolution had expressed itself in two major phylogenetic processes. One was a tendency toward passive adaptation to prevailing environmental conditions, and the other was a trend toward increased biological complexity that permitted specific phylogenetic continuua to vary their response to changes in the environment in a manner which would facilitate their ability to survive and produce future generations. The combined result was adaptive radiation resulting in what we call speciation.

In the case of the more complex life forms, the latter trend led to an improved ability to respond to changes in the environment took the form of increased mobility as a result of an enhanced ability to detect what was taking place in the environment and to respond to such changes in a manner which would ensure the survival of the phylogenetic continuum to which they belonged. Thus, in the case of the hominids and manlike creatures, there was selection in favor of higher intelligence – an enhanced ability to analyze the information received from the sensory organs and with the aid of memory to devise appropriate survival-oriented responses. Certainly in the case of man, there also arose an ability to suppress immediate gratification in favor of the attainment of long-term benefits – an essential attribute for the creation and maintenance of civilization.

As Rushton (1994) has observed, there is a distinct link between brain size and intelligence in the record of evolution. "More intelligent children, assessed by standardized IQ tests, learn faster than those less intelligent, and mammals with larger brains learn faster than those with smaller brains (i.e. chimp > rhesus monkey >

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spider monkey > squirrel monkey > marmoset > gerbil > Squirrel).[1]

The Importance of Intelligence

As Charles Darwin observed:

> Man in the rudest state in which he now exists is the most dominant animal that has ever appeared on this earth. He has spread more widely than any other highly organized form; and all others have yielded before him. .... These several inventions, by which man in the rudest state has become so pre-eminent, are the direct results of the development of his powers of observation, memory, curiosity, imagination, and reason."[2]

The renowned geneticist Th. G. Dobzhansky confirmed:

> However incomplete our knowledge of human ancestry, there is scarcely any doubt that the development of brain power, of intelligence, was the decisive force in the evolutionary process which culminated in the appearance of the species to which we belong. Natural selection has brought about the evolutionary trends towards increasing brain power because brain power confers enormous adaptive advantages on its possessors. It is obviously brain power, not body power, which makes man by far the most successful biological species which living matter has produced.[3]

As a result of natural selection, the hominid brain expanded at a remarkable rate in the past million years, more than doubled by the time of the emergence of the first *Homo sapiens sapiens* some forty thousand years ago.[4] As Ernst Mayr wrote in 1963, "The most astounding phenomenon of human evolution is the rapid increase in

[1] Rushton, Race, Evolution, and Behavior, Transaction Publishers. 1994, p. 36.

[2]. Charles Darwin, *The Descent of Man* (New York: Modern Library ed. Reprinted from 6th ed., 1872), pp. 431-32.

[3]. Theodosius G. Dobzhansky, *Evolution, Genetics and Man* (New York: Wiley & Sons, 1955), p. 334

[4] George R. Harrison summarized this fact from what was already well-known amongst paleoanthropologists as early as 1956, in his book *What Man Might Be*. p. 263.

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brain size since the Pleistocene."[5]

Intelligence led to tool-making, and eventually to a situation which has made humankind dominant over virtually the entire organic world. However, since the introduction of agriculture about ten thousand years ago, mankind has multiplied enormously in numbers, but has also been devolving in certain ways. It is arguable that the decrease in the size of the brain, from the Cro-Magnons, who might be regarded as the first Caucasoids, and who averaged a brain size above that of most living peoples of today's world, may indicate a decline in intelligence.[6]

Evolution, Brain Size and Intelligence

No paleontologist would dispute the significance of the rapidly increasing brain size in the prehistory of humankind – of the hominids. This increase in brain size may be summarized as follows:

Australopithecus	621 cc.
Pithecanthropus erectus	855 cc.
Australian Aborigines (male)	1300 cc.
Early 20th century Parisians	1550 cc.[7]

The sheer size of the brain is relevant for two reasons. Most obviously, a small brain simply cannot hold as many brain cells as a large one. Less obvious, but more important, is that the true quality of a brain must be measured by the complexity of linkages between cells.[8]

As early as 1909 Edward A. Spitzka measured the brain weight

[5] Ernst Mayr, *Animal Species and Evolution*, 1963, Cambridge: Harvard University Press, p. 650.

[6] Alfred L. Kroeber reports that the five male skulls from Grimaldi contain from over 1,700 to nearly 1,900 c.c. – an average of 1,800 c.c.; that of the old man of Cro-Magnon, nearly 1,600 c.c.; of a woman there, 1,550 c.c. If these individuals were not exceptional, the figures mean that the size and weight of the brain of the early Cro-Magnon people was some fifteen or twenty per cent greater than that of modern Europeans. *Anthropology* (New York: Harcourt, 1958), pp. 27-28.

[7] Marcelin Boule, Fossil Man: Elements of Human Paleontology, translated from the French by Jessie E. and James Ritches, Edinburgh, 1923, p. 229

[8] F. Clark Howell, *Early Man*, Time Inc. 1969, p. 82

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of 130 eminent men, and found that the average weight of these was 100 grams more than that of the average Caucasoid.[9] According to Pitirim Sorokin, a similar study showed that a series of 35 eminent men had an average of 1665 cc. cranial capacity, as compared with an average of 1500 cc. for white males measured in accordance with the same standards.[10] It is true that genius arises partly due to what has been called emergenic traits, the chance bringing together of a number of genes in a combination that produces notably high ability, but the fact remains that such genes have to be present in the genotype of the parents, and that it is imperative that a population be comprised of individuals of high genetic quality if it is to produce geniuses, as well as individuals of high general phenotypic ability.

Overall brain size is not solely and directly related to intelligence when comparisons are made between different species. Much depends on what areas of the brain are most developed. Much or the brain is concerned with non-abstract reasoning activities. An elephant has a larger brain than a man or an insect. Dolphins, which show remarkable intelligence, have large brains, but only a very thin neocortex and an absence of frontal association areas:[11] they are also unlikely to master the intricacies of trigonometry or algebra.

Similarly, the frontal lobes appear to have much to do with human ability to concentrate on long term goals, rather than to react directly to whatever immediate stimuli may activate their minds. Science and civilization are totally dependent on the ability to direct the activities of the mind to long term goals, rather than to yield to the temptation for immediate gratification – to permit the attention of the brain to be redirected to whatever environmental impulse may impinge upon it, regardless of the significance of that impulse to long term achievement or survival.

In short, mammalian brain size is allometric: the members of the same species, and especially subspecies, will tend to have similar brain

[9] E.A. Spitzka, "A Study of the brains of Eminent Scientists and Scholars" in Transactions of the American Phil. Society, Vol 21, p. 175-308.

[10] Pitirim Sorokin, 1965, p. 220-245, Social and Cultural Mobility, Free Press.

[11] G.R. Langworthy, "A Description of the Central Nervous System of the Porpoises", *Journal of Comparative Neurology*, Vol 54, 1932.

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structure, with brain weight being equal to body weight times a standard fraction and carried to a given power.[12] Human evolution shows an overall allometric increase in brain size, and also an increase in the size of those areas of the brain on which creative, abstract thought and the direction of rational analysis depend. Within the human species, however, subspecies and populations also reveal discrepancies in this respect: if they did not, no evolution could have taken place. Evolution was only possible when those with more efficient brains for solving problems and directing activities to long term goals survived to reproduce more plentifully than those with less efficient brains.

Intelligence is heavily determined by heredity. As Ernst Mayr observed:

> Nor can there be any question that intelligence has in part a genetic basis, and it is quite immaterial for our argument whether the heritability of intelligence is 25 percent or 75 percent. Finally, there is abundant statistical evidence that in most communities those people whose professions require high intelligence produce on the average smaller families and at a later age than do people like unskilled laborers, whose professions do not make such requirements ... The weight of the available evidence fully supports Huxley's conclusion that those who are intellectually best endowed contribute less to the gene pool of the next generation than do the average and, indeed, most of the less than average.[13]

The link within the human species between brain size and intelligence has been clearly demonstrated by J. Philippe Rushton in his 1994 book entitled *Race, Evolution and Behavior: A Life History Perspective*, and by Arthur R. Jensen and F. W. Johnson in "Race and Sex Differences in Head Size and IQ", published in *Intelligence* (1995). Also the heritability of intelligence and of personality in general has been firmly established in a multitude of studies, notably by Arthur Jensen in his renowned *Harvard Educational Review* article

[12] H. J. Jerison, "Brain to Body Ratios and the Evolution of Intelligence" in Science, 1955, p. 447-449.

[13] Ernst Mayr, *Animal Species and Evolution*, *op. cit.*, p. 659.

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(1969),[14] and other studies competently surveyed in Rushton (1994).

Consistent racial disparities also exist in regard to cranial capacity and brain size. This has been well established by numerous studies, as detailed in a survey provided by J. Philippe Rushton in an article entitled "Cranial Capacity Related to Sex, Rank and Race in a Stratified Random Sample of 6,325 U.S. Military Personnel," published in *Intelligence* (16:401-413, 1992). Certainly the admixture of various living stocks could lead to the averaging down of the ability of more advanced populations by genetic admixture with those populations or phylogenetic continuua which were less advanced in intelligence.

The Threat to the Future Intelligence of Humankind

However, the changes that have been wrought in the life of Humankind by advanced technology have changed the circumstances in which evolution operates. Formerly evolution resulted from survival, and survival, as Nature's pruning knife, tended to reduce the chances that those who were less fitted to survive would leave behind them a proportionate number of offspring. Modern medical technology and methods of food production and distribution, and modern ethics – which have caused Western societies to convert their sense of altruism into a belief that they should aid all humankind in the competition to reproduce, regardless of the longterm consequences of their actions – have blunted Nature's pruning knife, so that today human evolution is directed not by fitness to survive but simply by the capacity to produce large numbers of offspring. This switch from fitness to fecundity as the driving force behind human evolution seems to have arisen whenever and wherever humankind achieved a degree of urbanized civilization.

Thus the British paleontologist, Sir Arthur Keith, early concluded that a dysgenic decline in intelligence may have been responsible for the collapse of the earliest human civilizations of antiquity:

> Babylonia, Egypt, Greece and Rome did not fail for lack of

[14] "How Much Can we Boost IQ and Scholastic Achievement", *HER, 39:1-123.*

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> children, but for a dearth of children of the right kind. There is no doubt that civilization exposes the ablest of her votaries to an extreme temptation – the temptation of luxury. The basal and essential condition for racial progress is a healthy birth rate – in every grade of every community. As we raise our standard of living, the more expensive becomes the maintenance and education of our children; we become more and more tempted to spend on ourselves what should be sacrificed in raising another generation.[15]

And the danger of biological degeneration is emphasized by the Nobel Prize-winning geneticist, Hermann J. Muller:

> Another way in which lack of a very highly developed social impulse must in the end lead to the downfall of any civilization so afflicted lies in its biological undermining. For civilization affords an excellent chance to breed for many sorts of the weak, the stupid, and the vicious characters which are continually arising. . . . Actually, there are indications that under civilization many traits that are detrimental to the species as a whole are propagated at a *faster* rate than the normal, so that the otherwise exceedingly slow biological degeneration is thereby hastened. This, when the increasing complexities of living are really calling for even greater ability on the part of the group as a whole.[16]

William McDougall, the noted psychologist, took a similar view:

> Looking at the course of history widely, we may see in the tendency of the upper strata to fail to reproduce themselves an explanation of the cyclic course of civilization.[17]

Since the introduction of agriculture about 10,000 years ago mankind has multiplied enormously in number but has also been devolving in important ways. It is indeed questionable as to whether

[15] Sir Arthur Keith, *Concerning Man's Origin*, *op. cit.*, p. 125.
[16] H. J. Muller, *Out of the Night*, 1935, New York: Vanguard, pp. 42-43.
[17] William McDougall, *Group Mind* (London: Cambridge, 1939), p. 260.

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his innate intelligence has advanced. Due to humankind's greatly enlarged numbers, he probably has more good minds at work today than the most intelligent hunters could have mustered at any one time. However, the average intelligence of the population may well be declining due to dysgenic trends in reproduction – there is a fear that future generations are being bred increasingly from the less intelligent. Mankind specialized in intelligence rather than tooth or claw, and many scholars fear that this is spiraling downward. Some estimates place it as at least a one point drop in IQ per generation. This has been particularly stressed in the much-debated 830-page book by Richard J. Herrnstein and Charles Murray entitled *The Bell Curve: Intelligence and Class Structure in American Life*.[18]

Mensa, a worldwide organization limited to the most intelligent two per centum of the population, reported in the 1963-64 *Mensa Register* that the number of children of every member of this group during the child-producing years averaged only 1.57 children per couple – a figure far below replacement level. And this figure must be considered in the light of the fact that the world population is currently doubling itself roughly every 25 years. In America, the U.S. government pays more than a million of its most incompetent females to reproduce repeatedly, and is reported even to have paid for fertility pills to heighten their rate of reproduction![19]

As Douglas J. Besharov wrote as recently as 1995, in the U.S. hundreds of thousands of unwed mothers have made welfare a way of life. And these unwed mothers, and the males who father their children, are not generally regarded as the brightest or most intelligent members of the community.[20]

The Need for Positive Eugenics

[18] Published in 1994 by The Free Press, New York.

[19] *Chicago Tribune*, April 8, 1994. "In Massachusetts, some officials were surprised and chagrined to discover that their Medicaid program was supplying fertility drugs to women, a majority of whom were receiving welfare as single mothers. And astonishingly, two of them already had eight youngsters. A *Newsweek* survey found that numerous other states also paid Medicaid bills for fertility treatment to help poor women have children."

[20] "The Contraceptive Gap," *The Washington Post* (March 12, 1995)

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The need for eugenics to counterbalance the dysgenic trends in contemporary human populations was first recognized by modern scientists toward the end of the nineteenth century. Many realized that each generation is in effect a genetic bottleneck, and that any genes lost by failure to procreate are lost forever. The entire future of humankind is reshuffled with each generation's reproductive achievements.

Sir Francis Galton recognized the need for eugenics, and indeed actually created the term. As he wrote:

> Man is gifted with pity and other kindly feelings; he has also the power of preventing many kinds of suffering. I conceive it to fall well within his province to replace Natural Selection by other processes that are more merciful and not less effective."[21]

The early eugenicists have been much criticized during the past four or five decades, and attempts have been made to imply that they based their eugenic theory on principles which were unsound by modern genetics. These suggestions are misleading in the extreme, for modern genetics has opened the door to efficient eugenics. However, in a recent article entitled "The Hidden Science of Eugenics," published in *Nature* (1995),[22] Diane B. Paul and Hamish G. Spencer openly admit that "The early eugenicists were not stupid", they simply were not constrained by the prevailing "social values." The fact is that the early eugenicists, as also contemporary eugenicists, reflect social values which encompass a compassion that goes far beyond their own generation to include the untold myriad of generations yet to be born.

Hermann J. Muller, in particular, was firmly convinced that in the case of mental traits even more than of those having to do with general health and vigor, there is reason to conclude that selection has greatly relaxed under modern conditions.[23]

Linus Pauling agreed:

[21]. Sir Francis Galton, *Memories of My Life* (New York: Dutton, 1908), p. 322.

[22] Nature, Volume 374, 23 March 1995.

[23] Hermann J. Muller, "Our Load of Mutations," *American Journal of Human Genetics*, Vol. 2, No. 2, June, 1950, p. 165.

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> I am unhappy that the pool of human germ plasm, which determines the nature of the human race, is deteriorating. The collection of molecules of deoxyribosenucleic acid that will make the next generation of human beings what it will be is not so good as that which determined our character; there are more bad molecules in the collection. The defective genes are now not being eliminated from the pool of human germ plasm so rapidly as in the past, because we have made medical progress and have developed feelings of compassion such as to make it possible for us to permit the individuals who carry the bad genes to have more progeny than in the past. Moreover, defective genes are being manufactured at a greater rate than in the past, because there are new mutagenic agents operating in the world today.[24]

And Ernst Mayr similarly assented:

> Man's genetic nature has degenerated and is still doing so. . . . It seems now to be established that, both in communist Russia and in most capitalist countries, people with higher intelligence have, on the average, a lower reproductive rate than the less intelligent; ... the genetic differences are slight, but ... such slight differences speedily multiply to produce large effects. If this process were to continue, the results would be extremely grave.[25]

Steven Jones, a geneticist at University College, London, has in recent years warned against the possible reversal of human evolution in his book *The Language of Genes: Solving the Mysteries of our Genetic Past, Present and Future*, published by Anchor Books (1994). He comments that "Natural selection has to some extent been repealed" with modern societies seeming "to conspire to slow down human evolution." Under natural selection the fit tended to survive to produce offspring while the unfit failed to leave the same number of progeny. But modern social conditions have reversed that situation.

[24] Linus Pauling, "Molecular Disease," *American Journal of Orthopsychiatry*, Vol XXIX, No. 4, 1959, p. 684.

[25] Mayr, *Animal Species and Evolution, op. cit.*, p. 658, quoting Huxley, *Evolution in Action, op. cit.*

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William K. Stevens authored an article in the *New York Times* (3/14/94) aptly entitled "Evolution of Humans May at Last be Faltering." Rapid evolution occurred during the Pleistocene, especially in those more temperate areas affected by the Ice Ages, and this was facilitated by the isolation of relatively small groups in disparate geographical environments. However, the barriers which formerly enabled selected populations to evolve rapidly under severe selective pressures, and then spread outward to replace less advanced subspecies, have now been removed by modern technology and the vastly increased size of the overall hominid population. As a result a melding of populations is creating a global gene pool, which in itself reduces the chances of further evolutionary selection – quite apart from the averaging down of intelligence as the more intelligent either interbreed with the less intelligent or are outbreed by the latter.

Dr. Ian Tattersall, a paleoanthropologist at the American Museum of Natural History, emphasizes that "Homo sapiens today is in a mode of intermixing rather than of differentiation, and the conditions for significant evolutionary change simple don't exist – and won't, short of some all-too-imaginable calamity." Unfortunately, the negative possibility, the calamity, is already revealing itself in the disparate birth rates between the more intelligent and the less intelligent.

This accumulative loss is not necessary. Nobelist Hermann J. Muller and others have shown how the decline can be stopped and even reversed gradually. The heart of their method is to increase the proportion of advantageous genes in the human gene pool.

Nevertheless the message has been ignored and belittled. This is one sign of the incomprehension and emotionalism prevailing today. It is like a drowning man refusing a life jacket because it doesn't fit comfortably. However, signs of recognition of its power and the increasing need for it have begun to appear.

In Singapore, since 1965, efforts to raise the intelligence level of the gene pool have been greater than in any other current country. This effort to increase its cognitive capital is associated with policies that have made Singapore the safest, the cleanest and the most prosperous of the post world war nations. China - with the most enormous gene pool in the world and one of the best, has also now

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begun to refine this pool.[26]

Many religious authorities, immersed as they are in the concept of divine predestination in respect of man and the universe, speak out against any form of eugenics. However, it is notable that Rabbi Jakobovits, former chief rabbi of Great Britain, not only recently endorsed eugenics, but advocated genetic engineering as a means to solve other problems, such as homosexuality.[27] The latter goal was naturally tendentious, but the use of eugenics or genetic engineering to ensure that an adequate supply of intellectual prowess is passed on to future generations of humanity should surely not provoke the hostile reactions it so often raises amongst those who care little for posterity.

[26] *San Diego Union-Tribune*, Friday, Oct. 28, 1994: "The Chinese legislature yesterday ratified a law that calls for aborting fetuses carrying hereditary diseases and restricts marriages among people suffering mental problems or contagious diseases." The innocuous-sounding Maternal and Infantile Health Care Law takes effect June 1. The agency reported that China has more than @.0 million disabled people whose births could have been prevented if such a law had been in effect.

[27] "Rabbi Favors Genetic Engineering," *The Detroit Jewish News*, July 30, 1993.

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BOOK REVIEW ARTICLE

Political Correctness and Research in Human Intelligence

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The g Factor:
General Intelligence and its Implications
by Christopher Brand
John Wiley & Sons
1996; 253pp. (Depublished 1996)

Much research has been conducted in recent decades into the concept of "general intelligence," which Charles Spearman identified simply as 'g'. Yet few scholars have attempted to consolidate the expanding body of empirical data into a distinct and comprehensive account which would include not only the findings of academic research but also the implications of these data for society. In *The g Factor: General Intelligence and its Implications*, Christopher Brand, a lecturer in psychology at the University of Edinburgh, has set himself to achieve this goal. In a concise but comprehensive study of general mental ability and its importance to educational and social policy, he surveys the data and shows why differences in *g* are of real consequence for society.

Scheduled to be released in April 1996, his book was suddenly withdrawn after review copies had already been sent out and copies had been sent to bookstores. From statements made by its British publisher, John Wiley & Sons Ltd., the decision to withdraw *The g Factor* from the market was not based upon any suggestion that Brand's work lacked scientific validity, or was not selling well, but on the ground that its contents were ethically undesirable. Wiley's sudden decision to withdraw Brand's book after completing a 15 month editing process, printing it, and advertising it in glowing terms, was highly unusual.

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Wiley stated that their decision was largely determined by quotes attributed to Brand by reporters who had interviewed him about the book. Brand had failed to reject the suggestion made by a reporter that he was a "racist," conceding that he accepted the validity of the statistics which showed persistent differences in IQ scores between races, and most notably a 15-point gap between American blacks and American whites, and that he believed that these racial differences were to a significant part rooted in heredity. Scientifically objective, rather than submissive to the prevailing media bias opposing any recognition of the role of heredity in human affairs, Brand agreed that it was possible to refer to him as a "racist in the scientific sense" in that environmental explanations failed adequately to account for racial differences in IQ test scores. In an interview with *The Scotsman*, Brand was quoted as saying, "I do think not only that there's a link between race and psychology, in particular between race and IQ, but of course I think and have the honesty to tell you – other people wouldn't – that the link is, shall I call it, deep-seated?"

Wiley's new catalogue had glowingly and accurately described Brand's book as "providing a focused review that is succinct, authoritative and up-to-the-minute," and asserted that it was a "concise, accessible and critical review of the scientific evidence." It was advertised as "of interest to the general reader as well as the undergraduate student." Indeed, Liz McMillen, reporting the furor surrounding the withdrawal of the book in *The Chronicle for Higher Education* (May 17, 1996) stated that "Although notions of race and intelligence are highly controversial in the media, a large body of research exists on the topic. *The Bell Curve* (Free Press, 1994) was a very successful popularization of that research. Several scholars described Mr. Brand's work as a moderate example."

Thomas Bouchard, renowned for his University of Minnesota twin studies program, expressed his dismay with the comment, "I thought we were moving away from this political correctness sort of thing. It just boggles the mind". James Flynn of the University of New Zealand, who disagrees with Brand on aspects of race and IQ, similarly stated that "The cowardice of publishers is a real problem that makes progress toward understanding the real world ... difficult" (p. 644, *Science* May, 1996).

A Wiley spokesman claimed that the decision to revoke was a

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"management" call based on "deep ethical beliefs." The decision appears to have originated in New York, where Charles R. Ellis, president and chief executive of Wiley, stated that the book contained "repellent" assertions, and commentators have observed that the decision appears to have been a political one which had nothing to do with the accuracy of the text. Wiley has not identified key passages that they maintain are objectionable, and Wiley's manager of corporate communications, Susan Spilka, has said that "We simply do not want to be the publisher of this book." She implied that if Brand had avoided discussing the sensitive issue of race with the press, the book would have been published without a hitch.

Wiley's failure to identify any specific passage in Brand's book as cause for withdrawing the book even led Marek Kohn, an opponent of "racism" who writes for the *New Statesman*, to comment on Internet (http://www.hrc.wmin.ac.uk/racegallery/) that "it would be helpful if John Wiley were to clarify exactly what it has discovered to be so "repellent." If they are referring to policy recommendations or statements of personal opinion made by Mr. Brand, then they are merely left with egg on their faces for having commissioned and promoted his book. If the material they find unacceptable consists of statements Brand claims to be 'scientific fact,' then they are in the uncomfortable position of pulling a book on the grounds of its claim to scientific truth."

Very likely, of course, Wiley may also have been concerned about the adverse attention they would likely have received from leftist academics and political activists if they had continued to fill orders for copies of the book. Brand had argued that low IQ was an important ingredient in the problems of single-parent families and abused children, but according to the *Daily Telegraph* (16 April, 1996) University of Exeter's Michael Howe thought that Brand's statements were "dangerous," Keith Millar of Glasgow University said that Brand's suggestions were similar to Nazi plans for a master race, and Labour Member of Parliament John McFall, whose degree of familiarity with the findings of psychological research is not known to this reviewer, asserted that Brand's comments should be "buried along with his reputation."

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Leftist students, more committed to Marxist goals than to dispassionate scholarship, launched a vitriolic campaign at the University of Edinburgh (bussing in activists from other cities) to demand Brand's dismissal, and the Vice Chancellor of Edinburgh University, Sir Stewart Sutherland, went on record with the statement that "the large majority of my colleagues in university do not share conclusions on eugenics apparently held by Mr. Brand." This was possibly an accurate statement, in light of the politically-charged aura which today envelopes so much of British academe. However, one wonders at the fact that while failing to press charges against those who defaced university property with demands that Brand should be dismissed, the university chose to investigate Brand's "teaching relationship" – a move which might well affect his future career.

Yet Brand did no more than agree with the position already well established by authors such as Jensen (1969, 1980, 1981), Seligman (1992), Herrnstein and Murray (1994), Itzkoff (1994), Rushton (1995) etc., whose books say much the same as Brand's, except with more emphasis on race. He also supported his study with voluminous references to the findings of scholars such as Lynn, Scarr-Salapatek, Schmidt, Ones and Hunter, Snyderman and Rothman, Silverman and White.

Despite Wiley's decision to withdraw the book from publication, a number of IQ experts across the research spectrum have already commended *The g Factor* as a valuable summary of the evidence substantiating a level of general mental ability. The renowned London psychologist Hans Eysenck commented that Brand "examines the curious fate of Spearman's *g* and discusses general intelligence and its implications. It is an important job, extremely well done, by someone clearly acquainted with the historical roots of the controversies that have raged around this concept, and anyone wishing to know just what happened, and where we are now, can do no better than read this book." Similarly, Douglas K. Detterman, editor of *Intelligence*, has described Wiley's action as a "knee-jerk, liberal response" which was "an egregious error" that placed Wiley's reputation at stake.

Brand Recognizes Environmental Influences

Brand cannot be accused of ignoring environmental influences

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in society. He is concerned about the need for a healthy and stable child-rearing environment. "If children of the future are to receive maximum intellectual and education levels and to be more employable," he writes, "there would need to be fewer homes where parent and caretakers were un-stimulating, drug-addicted, neglectful, and themselves of low IQ – even assuming large environmental origins of g". But Brand declares in the preface to his book that he proposes to examine the literature relating to IQ and its relevance to public policy issues boldly without any cover-up of sensitive material. Factual objectivity, not political sensitivity, is his announced goal.

He discusses the literature relating to the question as to whether there is such as quality as "general intelligence". Individuals who do well on one psychological test tend to do well on others. Brand further shows that whatever IQ tests may measure, they tend to be accurate predictors of success both in the academic world and in life.

Brand covers the objection sometimes raised that tests measure only "academic intelligence," pointing out that even noted critics admit that lawyers, engineers, and chemists virtually never have IQs below 100. Even the military, an organization that is not usually considered to value academic aptitude, still finds tests useful. In one of many great lines in the book (p. 32), "By definition, it cannot be 'narrow academic skills' that boost efficiency ratings and remuneration across a wide range of jobs types: grasping capitalist employers and crime-busting police chiefs will surely not be taken in for long by mere scholasticism."

Brand outlines Jensen's work on intelligence and "decision time," but stresses the relationship with "inspection time," an area which he himself pioneered (Brand & Deary, 1982). In inspection time experiments the subject is shown (often with a tachiscope) for a fraction of a second two markedly different lines (2.5 inches versus three inches) and asked to say which is longer. The minimum time the subject must see the lines, to determine which is longer, is recorded. This task correlates closely with intelligence. Some psychologists, such as N. J. Mackintosh, writing in *Nature,* have chosen to debate Brand's view that the correlation of *g* with "inspection time" (IT) – the speed with which a person can discriminate

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between two visual or auditory stimuli – is as high as the .75 Brand places it at. This is a much-discussed aspect of intelligence (Arthur Jensen maintains that both "Reaction Time" (RT) and IT are linked to IQ, and that there is a high correlation between IT and *g*).

Brand then proceeds to survey the psychological mechanisms that underlie *g*, and are responsible for differences in IQ tests and everyday abilities. This leads him into the debate on the relative extent of genetic and/or environmental influences and what he calls their *psychogenetic* interplay, and the biosocial or survival value of intelligence.

Having covered the literature regarding the reality of IQ, the efficiency of IQ tests and the degree of heritability of IQ, Brand proceeds to examine the implications of this data for society. One conclusion reached by researchers is that *g* is substantially inherited (scholars such as Jensen attribute as much as 80% to genetics whereas Brand conservatively accepts a 45% variation in intelligence due to "narrow" genetic factors). Because of this significant element of heritability (whether 45% or 85% or some figure in between), clearly the question as to who is producing the most children is of importance to posterity. This reflects Herrnstein's view that society is being divided into two streams which will eventually tend to become castelike in their character: a more intelligent upper class and a less intelligent underclass.

Implications for Schooling

Brand is concerned that under the present custom of grouping children in classes according to age rather than ability, the more intelligent students waste time studying material they have already mastered. In Montreal, he points out, research shows that 45% of the children know 60% of the school curriculum in French and mathematics before the school year begins (Gagne, 1986). In a study of 160 gifted English school children, 60% were found to be doing classwork at a level more than four years below their actual attainments (Painter, 1976) and the top 10% of 7 1/2 year-old-children are higher in g than the bottom 10% of 15 1/2-year-olds (Raven 1989).

Although modern educational theorists talk about allowing children to progress at their own speed, this cannot be done by the teacher when the class contains pupils of widely disparate ability – the

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teachers simply cannot teach different levels at the same time. Brand suggests that the problem of matching children's mental ages could be solved by putting brighter eight-year-olds, say, with the nine-year-olds, and the slower eight year-olds with the seven-year-olds. There is an impressive list of studies showing that the mental age predicts social ability better than chronological age, and in 11 out of 12 measures of social and emotional adjustment, gifted children in Grade 3 were found to be more advanced than average children in Grade 6 (Lehman & Erdwins, 1981). Brand argues that there is no sound evidence that grade advancement will result in either social or emotional maladjustment (Silverman, 1989, and Feldhusen, 1991).

Racial Differences in Intelligence

As observed earlier, it would seem to be that much of the opposition roused by Brand's book has to do with his willingness to report the facts about race and performance in IQ tests. Because race is solely a biological matter, rooted in heredity, it is not surprising that different breeding populations may be found to differ from each other in the genetically-based abilities. Brand compares the claims that tests may be biased against members of certain races. He cites evidence that measures of intelligence predict school performance equally well in both groups, and that IQ tests correlated well with job performance in all racial groups, commenting that in fact "the tests slightly over-predict scholastic and workplace performance by blacks and are to that extent unfair to whites and Asians in competition for the same positions."

Brand states that there is no convincing evidence to support the charge that lower performance of certain races in IQ tests was due to "prejudice" or other environmental handicaps. He states that "almost the full Afro-American deficit, of some 15 IQ points, could be detected in children as young as three years, born to black mothers who were themselves college educated, married and had no pregnancy complication or health problem (Monte & Fagan, 1988). Medically and socially matched, these young black children had a mean IQ of 91 and the white children tested at 104." The scores of students of different races, matched for socioeconomic status, negate most of the

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environmental theories for racial differences. What is more, most three-year olds have not been in school or otherwise exposed to much of the world outside of their own family and community, but they still reveal statistical IQ differences by race.

Where black children had been adopted into the homes of white middle-class homes there was usually "an 8 point IQ gain plus some narrowing of the gap between black and white adoptees at age 7; but by age 17, the black youngsters lagged the white by the usual 12-15 IQ points (Weinburg, Scarr & Waldman, 1992; Lynn, 1994)."

This kind of data becomes provocative in the eyes of Brand's politically-inspired critics when linked to statements that "A eugenic policy focused on IQ must be attractive to any would-be improver of human happiness – whether hereditarian or environmentalist." Brand contrasts the social implications of "pure environmentalism" with those implicit in an acceptance of at least partial genetic influence in the determination of human abilities. Quoting Reed and Reed (1965) who collected data on 80,000 descendants of the grandparents of 289 state colony patients having IQ's below 70, he points out that the overall rate of mental retardation would have been reduced by 50% if the mentally handicapped individuals had not had children, even though only 88 of the 289 patients were diagnosed has having retardation of definitely genetic origins. What is happening here is that those suffering from retardation of unknown origin are having children who are themselves retarded, which suggests a genetic cause for most such cases.

Brand further observes that there is today a trend which was not present at earlier stages of human evolution: today, in most Western or industrialized societies the less intelligent are producing more children than the more intelligent. High rates of illegitimacy among the underclass are contributing to this. One way to reduce teenage illegitimacy rates and to offset the plight of the underclass, Brand points out, is abstinence from sex among people who cannot show themselves able to assume the responsibility of parenthood.

Although Brand does not go on to say so, it is a source of wonder to many who are familiar with biosocial evolutionary theory that anyone should ever fail to appreciate the role that intelligence has played in the evolution of man, and consequently the genetic or biological implications of evolutionary selection in favor of higher

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intelligence. Intelligence is an essential element in the ability of *Homo sapiens* to identify potential threats to their survival and to devise courses of action which will promote the individual's survival chances. Biological constructs which permit more intelligent reaction to challenges or changes in the environment would result in a long term reproductive or genetic selection in favor of intelligence, and since race is nothing if not a matter of genetics and biology, it is only to be expected that there will be statistical differences in the intelligence of different breeding populations, micro-races or races.

But we may well ask, as Bouchard asks, when will scientists be permitted to examine data that impact on social issues free from political constraints – if ever?

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Book Reviews

Comanche Political History: An Ethnohistorical Perspective 1706-1875
By Thomas W. Kavanagh
University of Nebraska Press
1996 586 pp. $45

The Comanche are one of the most widely known yet least understood of the Indian groups on the plains. Although much has been published on Comanche history and culture, this is the first in-depth historical study of the changes and continuities in Comanche political organizations from their earliest interactions with Europeans to their settlement on a reservation in present-day Oklahoma.

Based on the critical analysis of documentary material from historical and anthropological archives in Spain, Mexico, and the United States, the study focuses on the different ways the Comanche tribes – the Yamparikas, Jupes, Kotsotekas, Quahadas, Penatekas, Tenewas, and Nokonis – organized and reorganized around the changing conditons of hunting, warfare, trade, and diplomacy. It also examines the ways the Comanches were portrayed by contemporary governmental authorities, the popular media and folklore, and by anthropologists and historians. The book also concentrates on alliances and mergers of different groups, with political regroupings occuring frequently according to convenience,

Chinatown Gangs: Extortion Enterprise and Ethnicity
By Ko-Lin Chin
Oxford University Press
1996 233 pp. $25

In *Chinatown Gangs*, Ko-lin Chin penetrates a closed society and presents a rare portrait of the underworld of New York City's Chinatown. Based on firsthand accounts from gang members, gang

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victims, community leaders, and law enforcement authorities, this pioneering study reveals the pervasiveness, the muscle, the longevity, and the institutionalization of Chinatown gangs. Chin reveals the fear gangs instill in the Chinese community. At the same time, he shows how the economic viability of the community is sapped, and how gangs encourage lawlessness, making a mockery of law enforcement agencies.

Ko-lin Chin makes clear that gang crime is inexorably linked to Chinatown's political economy and social history. He shows how gangs are formed to become "equalizers" within a social environment where individual and group conflicts, whether social, political, or economic, are unlikely to be solved in American courts. Moreover, Chin argues that Chinatown's 'informal' economy provides yet another opportunity for street gangs to become "providers" or "protectors" of illegal services. These gangs, therefore, are the pathological manifestation of a closed community, one whose life is not easily seen – and less easily understood – by outsiders.

Chin's concrete data on gang characteristics, activities, methods of operation and violence make him uniquely qualified to propose ways to restrain gang violence, and *Chinatown Gangs* closes with his specific policy suggestions. It is the definitive study of gangs in an American Chinatown.

Travels in Oceania: Memoirs of a Whaling Ship's Doctor, 1866
By Dr. Louis Thiercelin
(Translated and Edited by Christiane Mortelier)
University of Otago Press
1996 350 pp. $34.95

This is a translation from the French of early Nineteenth Century travels in the Pacific. First published in Paris in 1866 as *Journal d'un baleinier*, this translation focuses on Dr. Thiercelin's Pacific experiences but excludes the chapters in the earlier book which dealt with whaling.

Travels in Oceania takes the reader to New Caledonia, the

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Chatham Islands, the South Island of New Zealand, Tahiti and Hawaii. Thiercelin made two voyages in the Pacific, twenty years apart, on the *Ville de Bordeaux* 1837-41 and the *Gustave* 1861-64. He provides a rare point of view – that of a well-informed, educated European who was neither a missionary nor a government official. His commentary on French and English colonisation of the Pacific is insightful and he compares the different attitudes taken by the two governments towards both settlers and indigenous people. He advocates 'the power of the word rather than that of the sword' in colonial matters.

Thiercelin possessed a rare perspective on the Pacific because he visited many places twice, with a twenty year gap in between. Particularly valuable is his comparison of these societies 'before' and 'after' colonisation, especially in respect of his description of Akaroa Bay. *Travels in Oceania* is an account based on journals kept on the author's voyages. It is full of anecdotes and details of personal encounters, especially with settlers, and shares the private thoughts of an interesting man.

Celilo Tales: Wasco Myths, Legends, Tales of Magic and the Marvelous
By Donald M. Hines
Great Eagle Publishing, Inc.
1996 265 pp. $21.95

The Indian fishing sites about Celilo Falls on the Columbia River are deserted; the ancient village sites are empty. However, a considerable amount of Wasco Indian lore was collected by early ethnographers and is included in this volume, along with spectacular photos of Columbia River locale taken at the turn of the century.

The narratives explain the Wasco's beliefs concerning the origin of the moon and sun, and those of the constellations they identified. Many stories center on animal myths. Coyote brashly opens a box containing the spirits of those now dead, and allows them to escape. As a result, immortality was lost to mankind. A fearsome rattlesnake

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which attacks and swallows unwary youths is tracked to its lair, and a large fire was lit on which to slay the beast. In dramatic contrast to European folklore, where serpents are slain by princes and knights who risk their lives for their society, a slave boy was put into the monster's lair with instructions to tie a line to its tail so that those above might pull it into the open.

Other folk tales tell of sexual encounters between Wasco men and women and beasts. An Indian wife is left deserted for long periods by her gambler husband. She is desperately lonely and one night a handsome sweetly-scented youth enters and seduces her, promising to take her away. Despite numerous visits, the youth's promise is not kept. Then, at one dawn's light, as the youth departs the wife steals a glance; and sees the youth stride forth, and then suddenly drop to his belly – to resume his real form as a rattlesnake. She flees to her sister's home where, violently ill, she confesses the abomination that she has committed, and dies.

The forty-two Wasco tales in the volume are accompanied by detailed notes concerning comparable myths and legends in other parts of the Plateau Region.

Northern Haida Songs
By John Enrico and Wendy Bross Stuart
University of Nebraska Press
1996 519 pp. $40

The Northem Haida Indians comprise two closely related dialect groups; one on Graham Island, British Columbia, and the other on Prince of Wales Island, Alaska. This book describes the entire range of the Haida musical tradition – a tradition that nearly died out and is currently being revived – and documents its changes over more than a century.

A lengthy ethnographic description of musical genres that situates Haida music in the context of the Northwest Coast is followed by collection of 128 songs, fully transcribed and analyzed.

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EDGAR C. POLOMÉ

University of Texas, Austin

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